SCIENTIFIC MANAGEMENT AND LABOR

SCIENTIFIC MANAGEMENT
AND LABOR

6.50

BY

ROBERT FRANKLIN HOXIE

ASSOCIATE PROFESSOR OF POLITICAL ECONOMY, UNIVERSITY OF CHICAGO;
SPECIAL INVESTIGATOR OF SCIENTIFIC MANAGEMENT FOR THE
UNITED STATES COMMISSION ON INDUSTRIAL RELATIONS

D. APPLETON AND COMPANY
NEW YORK AND LONDON
1920

Copyright, 1915, by
D. APPLETON AND COMPANY

Printed in the United States of America

PREFACE

The book here presented is based upon an investigation of scientific management in its relations to labor, made by the writer for the United States Commission on Industrial Relations. The investigation involved a study of scientific management shops designated, in the main, by Mr. Frederick W. Taylor, Mr. H. L. Gantt and Mr. Harrington Emerson, leaders of the movement. In this shop study, the investigator was assisted by Mr. Robert G. Valentine, Industrial Counselor, appointed by the Commission to represent employing management, and Mr. John P. Frey, Editor of the "International Molders' Journal," similarly appointed to represent labor. Both Mr. Valentine and Mr. Frey were in close touch with the writer during the course of the investigation and the preparation of the report to the Commission, and both attached their signatures to that document as well as to the conclusions which were presented with it.[1] This monograph has also received their unqualified approval.

The discussion which follows is for the most part an attempt to test Mr. Taylor's claims respecting scientific management in its relations to labor, the claims of Mr. Gantt and Mr. Emerson being considered only in so far as they differ from those of Mr. Taylor. Justification for this mode of procedure is clearly set forth in the text.[2] It was found impossible, however, in comparing the claims with the facts revealed by the investigation, to make any consistent attempt to differentiate the conditions found in so-called Taylor, Gantt and Emerson shops, partly because of the limited time allowed for the work, but also because of the overlapping of influences and systems in practice. The writer, however, has been careful to exclude evidence from the unsystematized portions of shops, and from those in which the process of systematization has not had time as yet to produce characteristic results.

---

[1] See Appendix I.

[2] See p. 8.

In making this study the writer has had no desire to uphold or to condemn scientific management or either party to the controversy concerning it. He has tried simply to discover and to set forth the facts and the truth, in the hope of dispelling misconceptions and misunderstandings, that a basis may be found for constructive effort in the interests of all concerned. He has endeavored thus to emphasize in turn the possible benefits of scientific management, its actual results thus far in practice, together with their causes, and its fundamental relations to labor welfare. This mode of treatment may give to particular portions of the study an air of partisanship. Fair conclusions, therefore, are to be based only on the study as a whole, and the unbiased reader will reserve judgments to the end.

The present need has seemed to be for a clear-cut and concise treatment of the main points at issue between scientific managers and organized labor. What is here presented, therefore, is by no means a complete consideration of all the important phases of the subject. Some vital matters have been discussed very briefly and one very important topic—unfounded and unproved trade union charges against scientific management—has been omitted altogether. In a later study the writer hopes to discuss all aspects of the subject fully and to present the specific evidence which is necessarily omitted here as well as to differentiate as far as possible the results found in Taylor, Gantt and Emerson shops. It is to be noted, however, that the appendices to this volume contain a full statement of the vital points at issue between scientific managers and organized labor, as well as an analysis of the fundamental and specific information necessary for an examination and test of labor conditions, tendencies and effects in scientific management shops.

Most cordial thanks are due to Mr. Frederick W. Taylor, Mr. H. L. Gantt, Mr. Harrington Emerson, Mr. Carl G. Barth, and many other scientific management leaders, experts and shop officials, for willing and unstinted assistance in the prosecution of the investigation. The investigators were almost everywhere received with uniform courtesy, every opportunity for direct and thorough study was afforded, and all possible assistance was given them throughout. In addition, the managements of many shops devoted weeks and sometimes months to the careful preparation of answers to the printed questionnaire on which the investigation was primarily based.

The writer is under special obligations to Mr. H. K. Hathaway and Mr. A. E. Barter, who personally assisted in the study of some of the most important shops; to Professor L. C. Marshall, who thoroughly criticized the report to the Commission, and has collaborated in its revision, and to E. Andrews Swift on whose indefatigable coöperation and counsel the writer has depended throughout the investigation. Acknowledgment is made elsewhere of the obligations under which the writer rests to the official experts appointed by the Commission.

CHICAGO,
September 1, 1915.

CONTENTS

PART I

VIEWPOINT AND METHOD

PAGE
1. THE GENESIS AND NATURE OF THE INVESTIGATION 1
2. THE CLAIMS OF SCIENTIFIC MANAGEMENT RELATIVE TO LABOR 7
3. THE TRADE UNION OBJECTIONS TO SCIENTIFIC MANAGEMENT 13

PART II

CRITICAL EXAMINATION OF SCIENTIFIC MANAGEMENT IN ITS RELATIONS TO LABOR

A. POSSIBLE BENEFITS OF SCIENTIFIC MANAGEMENT TO LABOR AND TO SOCIETY 20

B. SCIENTIFIC MANAGEMENT IN PRACTICE

1. Introduction 25
2. The General Order and Completeness of Installation 27
3. Functional Foremanship 31
4. The Methods Employed in the Selection and Hiring of Workmen 31
5. The Character, Extent and Results of Attempts at Adaptation, Instruction and Training of the Workers 34
6. Time Study and Task Setting: Their Purposes, Methods and Results 39

PAGE

7. Rate Making, Modes of Payment and the Maintenance of Rates 61
8. The Protection of Workers from Over-exertion and Exhaustion 87
9. Opportunities for Advancement and Promotion . 92
10. The Modes of Discipline 95
11. Methods of Discharge and the Length of Service 96
12. Scientific Management and Industrial Democracy 98
13. Causes of the Shortcomings of Scientific Management in Practice 113

C. SCIENTIFIC MANAGEMENT AND LABOR WELFARE . . 123
Modern Industry and Craft Skill.

APPENDICES

I. CONCLUSIONS RESULTING FROM THE INVESTIGATION 137
II. THE LABOR CLAIMS OF SCIENTIFIC MANAGEMENT ACCORDING TO MR. FREDERICK W. TAYLOR . 140
III. THE LABOR CLAIMS OF SCIENTIFIC MANAGEMENT ACCORDING TO MR. H. L. GANTT 150
IV. THE LABOR CLAIMS OF SCIENTIFIC MANAGEMENT ACCORDING TO MR. HARRINGTON EMERSON . 152
V. THE TRADE UNION OBJECTIONS TO SCIENTIFIC MANAGEMENT 169
VI. VITAL POINTS AT ISSUE BETWEEN SCIENTIFIC MANAGEMENT AND LABOR BASED UPON THE LABOR CLAIMS OF SCIENTIFIC MANAGERS . 178
VII. VITAL POINTS AT ISSUE BETWEEN SCIENTIFIC MANAGEMENT AND LABOR BASED UPON THE TRADE UNION OBJECTIONS TO SCIENTIFIC MANAGEMENT 187
VIII. QUESTIONNAIRE: SCIENTIFIC MANAGEMENT AND LABOR 196

SCIENTIFIC MANAGEMENT AND LABOR

PART II

CRITICAL EXAMINATION OF SCIENTIFIC MANAGEMENT IN ITS RELATIONS TO LABOR

A. Possible Benefits of Scientific Management to Labor and to Society

Experience and reason leave no doubt that a close causal elation exists between productive efficiency and possible wages. No one can deny, therefore, that greater producive efficiency and output make possible higher wages, in general, and better conditions of employment and labor. While in particular instances and trades, wage advances, mproved conditions of work and better standards of living can be secured and maintained solely through increased bargaining power of the labor group, the community as a whole, including all classes of labor, can consume more and live better only through an increase in the goods produced. But increase of output is dependent on lower cost of production. Mr. Taylor was right, therefore, when he set up as a goal of achievement and principle of scientific management, "Higher wages with lower labor cost." Lower abor costs make higher wages possible, and, while lower capital costs are equally significant in this respect, without both, higher wages for all and in the long run are not likely to be realized to any considerable extent.

In so far, then, as scientific management affords opportunities for lower costs and increased production without adding to the burden of the workers in exhausting effort, long hours or inferior working conditions, it creates the possibility of very real and substantial benefits to labor and to society.

No one who has made a careful study of scientific management can doubt that it does, at its best, afford such opportunities to a very high degree. Fully and properly applied, scientific management may include and may not be incompatible with, all that is covered in the phrase "Science in Management," and it has of itself developed many devices for the saving of waste and many policies and methods for the improvement of the productive processes, not excluding ideas and methods which promise well for the betterment of labor conditions and the protection of labor interests.

At its best, as set forth by Mr. Taylor, and as realized in practice, scientific management means a thoroughgoing improvement and standardization of the material equipment and productive organization of the plant before an attempt is made to apply its peculiar methods and devices to the determination of standards of labor efficiency and wage payments. It means, thus, the installation of the best available machinery and tools so far as compatible with economy, or, at least, the overhauling and improvement of the existing equipment; the careful study of the materials of production and the determination of the speed and feed of the machines calculated under the circumstances to be most effective; the rearrangement of the material equipment so as to avoid the delays and expense of unnecessary carriage of materials and partly finished product, and to secure so far as possible continuous straight-line production; the introduction of known and new devices for economical and expeditious handling of materials and product; the careful study and analysis of the detailed processes and methods of production looking to the elimination of waste motions; the improvement of accessories; and the most effective application of force and coördination of effort; the reorganization of the managerial staff with a view to avoiding so far as possible multiplicity of duties and to securing definiteness of function and responsibility, and, therefore, managerial efficiency in every detail; the improvement of the methods of record keeping and accounting so that exact knowledge may be had at all times of available equipment and materials on hand, their disposition, actual and prospective, that the productive needs of the concern may be met without friction or delay; reorganization of the sales and purchasing departments with a view to broadening and stabilizing the market for the product, and purchase by specification, at the most economical rates, and in accordance with needs; improvements in the methods of stores-keeping which insure sufficiency of stock on hand, quick delivery and avoidance of interest and loss on superfluous and unusable stock; better methods of tool storage, care and delivery; and many other material and organic improvements, all possible, theoretically precedent to and quite apart from the setting of new tasks; the introduction of new modes of payment or the alteration in general of labor conditions and relationships. Great progress, even, can be made without resort to any devices directly affecting the status of labor toward the careful planning of the productive process and toward the exact routing of stock and special orders so that all the separate parts shall pass through the shop by the shortest available routes on schedule time at rates that will insure the meeting at every point of the proper materials, tools, machinery and workmen, and final prompt assemblage, so that workmen may be constantly assigned to definite tasks without friction or delay. All this is part and parcel of scientific management, when fully and properly applied, and, standing by itself, means saving of waste, lower costs and increased output of production and consumption goods without any necessary addition to the burden of the workers in exhausting effort, long hours or inferior conditions of employment.

Scientific management not only holds out, therefore, possibilities of substantial benefits to labor, but it points the way and the only way toward raising the standard of living for all classes of labor and for society at large. It is in the line of truly "efficient management" to which organized labor itself stands committed. Nor will it avail for labor to evade this issue by declaring that these features belong not to scientific management, but to science in management, for, on the principle that a thing must be defined in terms of what it actually is despite all efforts of friend or foe to fit it to their arbitrary conceptions, scientific management, at its best, is not only a systematic search for scientific productive methods, but is broad enough to include all that science in management demonstrates to be productively most efficient. That it is more than this and that its peculiar methods of dealing with labor may offset much or all of the benefits thus made possible pertains to another aspect of the problem and does not negative the conclusions stated above.

But, it must not be assumed that scientific management in its direct relations to labor is devoid of possible beneficial aspects and results. Scientific management is to a large extent an attempt at immediate standardization of labor conditions and relations. Through its analysis of jobs, it attempts to fix standard methods of labor and production in detail. It tries to set a standard task for each operation and advocates strict adherence to it. It attempts to establish standard rates of pay and through its vigorous claims that rates so set need not be and are not altered, coupled with the stress which it has laid upon the possibility of great savings and increased efficiency through the material and organic improvements of the productive process, it has forcibly called the attention of the struggling employer to the fact that there are other and more effective ways to meet severe competition than by taking it out of labor through the increase of the task and the cutting of wage rates. In fact, it has incessantly proclaimed the doctrine that only through the strict maintenance of rates and standardized conditions of employment, and through fair and liberal dealing with labor, can employers hope to escape from the slough of inefficiency and the evils of cut-throat competition. The mere recognition of labor standards is always protective, and when such recognition is accompanied not only by assurances of disaster to follow their violation, but by the demonstration that their maintenance is an essential factor in the general scheme of efficiency, the labor concerned stands to gain, in the long run, even though the advocates of standardization are not always themselves able to attain the ideal of standardization or are not guiltless of its violation.

It is true that scientific management and organized labor are not altogether in harmony in their attitude toward standardization of labor conditions and relations. While both seek to have the conditions of work and pay clearly defined and definitely maintained at any given moment, they differ fundamentally as to the circumstances which may justly cause the substitution of new standards for old ones. Trade unionism tends to hold to the idea that standards must not be changed in any way to the detriment of the workers. Scientific management, on the other hand, tends to regard changes as justified if they result in increase of efficiency. As we shall see later, time study, perhaps the most characteristic single feature of scientific management, constantly suggests and demonstrates new and more efficient means and methods for doing work. While, therefore, trade unionism and scientific management both seek standardization in the sense of definite conditions of work and pay, for all those engaged in a particular operation at any given moment, trade unionism stands for a maintenance of these conditions over a long period of time, while scientific management tends to result in their progressive alteration. Nevertheless, the adherence of scientific management to the ideal of the strict maintenance of standard conditions of work and pay as long as the efficiency conditions are not altered, marks a distinct advance in the interests of labor over the ideals which have been apt to govern the relations of employers to unorganized labor.

The same may be said of many other major claims of scientific management. Quite apart from the question of whether the ideals advocated are attained or at present attainable, and whether scientific managers are to be found who purposely violate them, scientific management has in these claims and in the methods upon which they are based, shown the way along which we may proceed to more advantageous economic results for labor and for society. It may not have succeeded in establishing a practical system of vocational selection and adaptation, but it has emphasized the desirability of it; it may not set the task with due and scientific allowance for fatigue so that the worker is guarded against over-speeding and over-exertion, but it has undoubtedly developed methods which make it possible to better prevailing conditions in this respect; it has called attention most forcibly to the evils of the favoritism, and the rough and arbitrary decisions of foremen and others in authority. If scientific management be shown to have positive objectionable features, both from the standpoint of labor and the welfare of society, this constitutes no denial of these beneficial features, but calls rather for intelligent social action to eliminate that which is detrimental and to supplement and control that which is beneficial to all. Fortunately, scientific management, in spite of dogmatic statements of certain leaders, is not one rigid and indivisible whole which must be accepted or rejected as it is, but is rather an experimental and developing entity, which can be modified and molded if its character and implications are thoroughly understood.

B. Scientific Management in Practice

1. Introduction

It is a common assumption that scientific management shops, in organization and methods, conform closely to the ideal and models presented by the leaders. This assumption is completely shattered by first-hand study of the facts. Comparative research demonstrates beyond any reasonable doubt that scientific management in practice is characterized by manifold diversity and by striking incompleteness, as compared with its theoretical counterpart.

In the course of the present investigation, no single shop was found which could be said to represent fully and faithfully the Taylor system as presented in the treatise on "Shop Management"; no representative of the Gantt system was encountered, complete and unmixed with alien elements; no shop was discovered wherein the Emerson ideals were completely demonstrated and held full sway, and no two shops were found in which identically or even approximately the same policies and methods were established and adhered to throughout.

If all this be true of the shops specially listed as representative by the three recognized leaders of scientific management, the variation that exists over the whole field of its activity, due to the operation of "independent experts" and the unsupervised efforts of managers, may well be imagined. It would appear in fact that scientific management in practice is never fully installed, the system never wholly conformable with the ideals and principles laid down by the leaders, and that each management has to some extent at least its own peculiar viewpoint and its own peculiar policies and methods which prevail in the installation and operation of the system.

This incompleteness and diversity in practice apply not merely to unimportant matters of detail but cover many of the most essential features of scientific management even among those shops designated by Taylor, Gantt and Emerson as representative of their work and influence. While in certain particular respects the ideals of the leaders are fairly carried out and consistency prevails, it is no exaggeration to say that incompleteness and diversity begin with the initial act of installation and end only with the latest specific features touching the operations of the shop and the relations existing between the workers and the management.

A stout volume would be required to set forth these diversities and to show the possible and actual bearing which they have upon the claims of scientific management and the welfare of the labor employed under it. It will be possible here merely to touch briefly upon a few of the most important aspects of this prevailing characteristic of scientific management in practice.

2. *The General Order and Completeness of Installation*

The best ideals of scientific management as expressed by Mr. Taylor and some of his most intimate associates[1] require that the installation of the system shall begin with a thoroughgoing study, improvement where possible, and standardization of the material equipment, managerial organization and productive processes of the shop. This preliminary work involves most of the details mentioned in the section on "Possible Benefits of Scientific Management."[2] Not until this material and organic improvement and standardization have been far advanced can definite tasks and efficiency ratings be fixed and rates of wage payment based on accomplishment be established, without the possibility and probability of grave injustice to workers, and, if the tasks are set closely, without the danger of overspeeding and exhausting at least some of them. For, without a high degree of material and organic efficiency and thorough standardization of equipment and processes, the conditions essential to high labor efficiency cannot be attained and uniformly maintained within a group, nor can individual workers be guaranteed against hampering circumstances over which they have no control.

---

[1] On page 8 it was stated that in examining the practice of scientific management as compared with the claims, the Taylor claims are taken as the general basis of comparison. When, therefore, in what follows, it is pointed out that these claims are not always realized in scientific management shops generally, including Gantt and Emerson establishments, this must not be taken as necessarily condemnatory.

[2] The installation of the best available machinery and tools so far as compatible with economy, or at least the overhauling and improvement of the existing equipment; the careful study of the materials of production and the determination of the speed and feed of the machines calculated under the circumstances to be most effective; the rearrangement of the material equipment so as to avoid the delays and expense of unnecessary carriage of materials and partly finished product, and to secure, as far as possible, continuous, straight-line production; the introduction of new and known devices for convenience and expedition in the handling of materials and product; the careful study and analysis of detailed

Notwithstanding, however, the position taken by the authorities in this matter and the clearest demonstration of the facts as stated, in practice there is no general adherence

processes and methods of production looking to the elimination of waste motions, the improvement of accessories and the most effective application of force and coördination of effort; the reorganization of the managerial staff so as to avoid as far as possible individual multiplicity of duties, and to secure definiteness of function and responsibility, and, therefore, managerial efficiency in every detail; the improvement of the methods of record keeping and accounting so that exact knowledge may be had at all times of available equipment and materials on hand, their disposition, actual and prospective, that the productive needs of the concern may be met without friction or delay; the reorganization of the sales and purchasing departments with a view to broadening and stabilizing the market for the product, and purchase by specification at the most economical rates, and in accordance with needs; improvements in the method of stores-keeping which insure sufficiency of stock on hand, quick delivery, and avoidance of interest and loss on superfluous and unusable stock; better methods of tool storage, care and delivery; so far as possible the careful planning of the productive process and the exact routing of stock and special orders, so that all the separate parts shall pass through the shop by the shortest available routes, on schedule time, at rates that will insure the meeting at every point of the proper materials, tools, machinery and workmen, and final prompt assemblage, and so that workmen may be constantly assigned to definite tasks without friction or delay.

to the order of installation as laid down by Mr. Taylor, and, in many cases, there is a notable neglect of the process of organic and material improvement. The better class of experts do indeed insist on beginning the installation of scientific management with the study and standardization of the material and organic factors. But, generally speaking, they are not able to carry this work forward to a reasonable degree before being forced to enter upon definite task setting or efficiency rating based on time study and the introduction of so-called "efficiency systems" of payment. The management usually wants to see quicker returns than can be secured by the slow process of systematic and thoroughgoing reorganization and the expert is usually forced to yield to the demand for immediate results that can be measured in cash terms. But it must not be supposed that all the experts even resist such demands. The better class in this respect are decidedly in the minority. It is safe to say that most of those who offer their services to employers have not themselves the ability or the willingness to install scientific management in accordance with the Taylor formula and ideals. They, too, are prevailingly after quick returns with small regard for the long-time outcome and little real knowledge or consideration for the real effects upon the workers so long as the latter can be kept reasonably contented and a good showing be made.

The result is that among the shops systematized there is no general uniformity in the process or completeness of installation. Thoroughgoing material and organic improvement and standardization are very often delayed and very often neglected. Some particular aspect or feature of the system is not infrequently stressed out of all proportion and this is very apt to be task setting or some particular system of payment. Sometimes, even, these labor features are the only ones seriously dealt with, and there are cases where they are the only important results of the work of the experts and where they become in the minds of both expert and management the essence and almost the only corporeal reality of scientific management.

In short, in this most general and important aspect of the order and thoroughness of installation, scientific management may mean anything or almost nothing, viewed from the standpoint of the ideals and principles of the leaders. In character and operation, the systematized shops range from a few which fairly closely approach the elaborate scheme advocated by Mr. Taylor through all possible variations down to that in which some single feature of his system is applied unaccompanied by other methods and policies necessary to make it a reasonable and effective agency of efficiency. Between these extremes, the forms of the Taylor system are often installed with more or less completeness at the same time that the spirit and principles are violated and discarded.

Among the specific aspects of the system exhibiting thus in practice great variation in character and results, often with serious violations or positive neglect of the Taylor claims and principles, are these: functional foremanship; the methods employed in the selection and hiring of workmen; the character, extent and results of attempts at adaptation, instruction and training of the workers; the purposes, methods and results of time study and task setting; the methods of rate making and the modes of payment employed, with their effects, especially on the maintaining of rates; the means used for protecting the workers from over-exertion and exhaustion; the opportunities offered for advancement and promotion; the modes of discipline; the methods of discharge and the length of service; and, finally, the general spirit and attitude adopted and maintained in dealing with the workers—the extent to which they are allowed a voice in the making of vital decisions; the means provided for the receiving of complaints; the consideration given to grievances and the nature of the final authority exercised.

3. *Functional Foremanship*

Relatively few of the scientific management shops employ the full system of functional foremanship, as outlined by Mr. Taylor. Some have never seriously attempted its installation. Others have installed it and later returned in full or in part to the old military order. In probably a majority of the shops, the old line foreman has not been entirely dethroned but some of his duties have usually been lopped off and assigned to other functionaries. The extent of this redistribution of duties and the amount of authority thus taken from the department foreman vary greatly. Often the new officials perform merely or mainly delegated duties, the old time foreman retaining practically all or a great part of his former directive and arbitrary authority. This seems to be the case particularly where labor is directly concerned. Other persons may be employed to deal with details of hiring, discipline and discharge, but the old line foreman, even so, not infrequently retains and exercises much of his former power in connection with these matters. The logical distribution of duties according to the Taylor scheme seems more capable of practical fulfillment than the distribution of authority. But in neither respect does scientific management in practice generally attain or approach with any degree of uniformity to the Taylor ideal. The results are such as to weaken materially the claims that scientific management treats each workman as an independent personality and that it substitutes joint obedience to fact and law for obedience to personal authority.

4. *The Methods Employed in the Selection and Hiring of Workmen*

Little uniformity prevails among the scientific management shops in the methods of selection and hiring, and no reasonable justification has been found for the claims that scientific management makes possible the scientific selection of the workers. Prevailingly, workers are selected and hired by the ordinary methods used in outside shops with all the variation which this statement implies. At the best, a separate labor department is established, charged with the duty of selecting workers, but rarely with final authority in the matter of hiring. The applicants are interviewed and observed in an attempt to discover their general capacity and aptitudes, mental and physical; their training, experience, industrial record, home surroundings, mode of life and habits are looked into and recorded, and often their state of health and strength are determined by physical examination. On the basis of this information, the best chances are selected and assigned to what appears to be appropriate work. The results thus attained depend, of course, on the intelligence and training of the labor head and the extent to which he is unhampered by less intelligent foremen and superintendents. In these respects much was found to be lacking. Some of the labor heads are men and women of long experience and keen intelligence. A greater number are young and of doubtful experience and capacity. Scarcely any who were interviewed seemed well acquainted with the best thought and experimental efforts and results in this connection. The more intelligent confessed to ignorance and to dissatisfaction with the methods used. Some hopeful results were found but the best were discovered outside scientific management shops. Generally, the work of the labor heads was hampered by other shop authorities. Except in a few of the most completely systematized establishments where the system has been relatively long in operation, some foremen or superintendents are apt to be found who cling tenaciously to their prerogatives, and openly or secretly attempt to nullify the new methods. But, on the whole, the work and results of the better class of scientific management shops, in the matter of selection and hiring, compared very favorably with the most advanced outside establishments.

At the worst, the methods of selection and hiring employed by scientific management shops were found to differ in no essential respect from those which are characteristic of the ordinary run of industrial establishments. Applicants are secured by the ordinary methods of notice posting, passing the word among employees to bring in friends and acquaintances, or newspaper advertising. Workmen are hired by foremen and superintendents and assigned to duties as openings happen to appear without any special investigation or any special attempt to determine individual characteristics and aptitudes.

Between the best and the worst, as thus described, all the usual degrees of variation exist. On the whole, there is practically nothing in connection with the methods of selection and hiring to distinguish the special group of scientific management shops from the outside situation with its good, bad and indifferent establishments, unless it be a certain tendency on the part of some to give trial to certain pseudo-scientific methods and systems.

Nevertheless, it must be conceded that, generally speaking, the workers in scientific management shops seem to be a select class *when compared with the same classes of workers outside,* but this result appears to be due not so much to the methods of initial selection employed as to subsequent events which tend to weed out the less satisfactory material. It certainly is not the outcome of any unique or scientific discoveries and achievements in connection with the process of hiring. But while all this constitutes a positive negation of scientific management claims in this connection, it should not be regarded as any attempt at condemnation of the system itself. The claims cannot be sustained merely because those who resort to scientific management are ordinary human beings, ordinarily circumstanced, and a scientific system of selection and hiring is still to be discovered.

5. *The Character, Extent and Results of Attempts at Adaptation, Instruction and Training of the Workers*

Once within the shop, scientific management, according to the claims made by Mr. Taylor, solves completely the vexing problem of the adaptation and adequate training of the workers. It sets "each man to the highest task for which his physical and intellectual capacity fits him," "employs in the shop a corps of competent specialists whose duty it is to instruct and train the workers and to assist them whenever difficulties arise in connection with the work," "systematically transmits" to them "all the traditional craft knowledge and skill which is being lost and destroyed under current industrial methods," "requires workmen to learn and to perform not one merely but several operations or tasks," and "educates and trains them mechanically as they were never trained before." In short, it constitutes a "practical system of vocational guidance and training," making possible the "mutual adaptation of the task and the worker," and opening the way "for all workmen to become 'first-class men.'"

It is evident that here we are in touch with the most vital problems of industry, viewed from the standpoint of general social well-being. It is the narrowing and destruction of skill and the mal-adaptation of workmen which have accompanied the development of modern industry that constitute one of the causes of discontent, degeneracy, crime, inefficiency and poverty. If scientific management can show the way through practical vocational adaptation and the rehabilitation of craftsmanship to the elimination or alleviation of these evils, it deserves the support of all classes whatever be its limitations and shortcomings.

But, unfortunately, investigation reveals little to substantiate the sweeping claims of scientific managers made in this connection, and much to show that in these matters also scientific management in practice varies with the special conditions found in different industries and with the special motives and exigencies which determine the policies of different shops.

Nowhere did the writer discover any scientific or adequate methods employed for adapting the worker to the task, that is, for "setting each man to the highest task for which his physical and intellectual capacity fits him." Aside from the initial process of selection which at best, as we have seen, falls far short of anything scientific or completely satisfactory in this respect, scientific management shops, in general, depend upon nothing in the way of general occupational adaptation of the workers except the ordinary trial and error method. The workman is set to the task for which he seems by general character and experience to be best fitted; if he fails after repeated trials, he is tried out elsewhere or finally let out. If he succeeds, little further attention is ordinarily given to the matter unless he shows special proficiency, in which case he is in line for promotion. Experimental tests may have been made by scientific management experts, psychological and physiological, for determining special industrial qualifications and aptitudes of workers, but none of them was discovered in the shops. Indeed, the impression of the writer was very strong that the average manager in a scientific management shop is not only quite indifferent to, but profoundly ignorant of, the broader and deeper aspects of the problem of vocational selection and adaptation. The term adaptation means to him setting the worker to an accomplishable task, and his whole philosophy of adaptation, in fact, seems to be summed up in the idea that if the workman makes the task, the problem is solved; unless he shows special proficiency, he may then be assumed to be "set to the highest task for which his physical and intellectual capacity fits him." This is not perhaps surprising, for the claims in this connection could only be the outcome of insufficient knowledge and understanding. It is generally recognized that the problem of vocational selection and adaptation is still far from solution. Psychologists have perhaps developed a technique to determine which of two men is better able at the time to perform a new task, but they have no technique, as yet, for determining which of these two men would finally become the better worker at the task, nor any for determining in which task any man would reach his greatest development. All this seems possible, but it is still a laboratory problem, and it is generally acknowledged that it will take years of study and experimentation by trained psychologists before the result is achieved.

Whether scientific management in practice makes good the claim of adaptation in the narrower sense of the term, i.e., whether it succeeds in assigning each workman "to a definite and by him accomplishable task," will be considered in a later connection.

The attention given to the instruction and training of workmen in scientific management shops is, in general, greater than that which exists in similar modern establishments as a whole, and the methods thus employed are at their best greatly in advance of those which characterize the average outside establishment, where apprenticeship has been abandoned. In shops where instruction is really stressed and where attention is devoted to the improvement and standardization of the processes and methods of work, the new hand is not dependent on the haphazard and grudging assistance of fellow workers, but is put in charge of competent instructors and is trained in the easiest and best methods of performing the work to which he is assigned, and both new and old workers receive the intelligent assistance of these instructors whenever difficulties arise in connection with the work.

The general claims of scientific management, however, in this connection, are far from being justified by the facts, for not only is there here also great diversity in the character and extent of the instruction actually offered, but the ideal of instruction in particular specialized tasks, to which scientific management stands committed, is ill-calculated to secure adequate results in this respect.

The employment of a special corps of instructors is by no means universal in scientific management shops. In some, no instructors were found, but new workmen were forced to depend entirely upon fellow workers and old line foremen for any assistance and training which they might receive. Where instructors were found, their duties were not always solely of an instructional character, but sometimes combined the often incongruous function of seeing that no worker lagged or failed to do his utmost toward the attainment of the task or complement of work assigned to him for the day. Where special instruction was given, it ranged all the way from careful initial training and, thereafter, friendly supervision, suggestion and assistance down to a few hours or moments of preliminary teaching and observation, after which the worker was thrown upon his own resources. The technical aids to instruction also varied greatly from industry to industry, from shop to shop, and from task to task. This is especially true of standard written instruction cards, which are generally supposed to be a universal characteristic of scientific management. In some cases, these cards, containing a most elaborate and minute analysis of the job with the time for each operation and drawings of the piece, are furnished each workman with each job, and absolute conformity thereto is demanded in the doing of the work; in other cases, such a card is posted for the section and the worker follows it or not as he prefers, the only demand being that the required results be attained. As the job becomes simpler and the work more repetitive, the written instruction card degenerates until it becomes a mere order to do so much work in so much time for so much pay, while toward the other extreme where the work requires exceptional judgment, skill and discretion, it also loses its significance and utility, and tends altogether to disappear.

This example perhaps fairly typifies the extremes of variation that exist among the group of scientific management shops with respect to the whole matter of instruction and training. Yet there is in this connection one universal ideal of scientific management which tends to work out uniformly in practice. Scientific management is essentially committed to division of function, which so far as the workman is concerned, is another name for specialization, and it works out practically in a tendency to confine and narrow the training of the individual worker. Scientific management shops, in general, have eliminated the apprenticeship system except for the training of a few beginners destined for managerial positions. In some cases, remnants of apprenticeship exist, which, in the form of schools, furnish instruction to beginners, but it is instruction for a particular kind of work. Scientific managers, in general, without hesitation, declare a preference for the one-job or machine specialist over the all-round workman. In the shops there is little, if any, attempt to train the mass of the workers in "not one merely but several operations or tasks." The theoretically systematic transmission to the workers "of all the traditional craft knowledge which is being lost and destroyed under current industrial methods," amounts in practice to the transmission to the individual of the knowledge required for his particular narrow job. Some few managers were found who did, indeed, favor the idea of a general shifting of all the workers through the section or department, and one or two who regarded such shifting as not impossible, but the idea was generally discountenanced and the practice was never found. It is not intended, however, to assert that all workers in scientific management shops are, as a matter of fact, narrow specialists, or that the design is to have them so. There is a practical limit to specialization decreed by the general exigencies of industry. Specialist workers are frequently absent and often their places must be filled immediately if the regular process of production is to proceed. Variation of orders and slack seasons also require that a certain portion of the workers be capable of shifting and of performing extra duties in the one case to meet special demands, and in the other to maintain an efficient organization. Scientific managers are not blind to these exigencies and, like other employers, attempt to provide for them. Sometimes this provision is made in the process of hiring, sometimes by carefully listing the capability of workers, and no doubt, at times, by the training of some of them in a plurality of operations. The fact remains, however, that, in general, the ideal which is upheld and striven for is specialized workmanship, and that instruction and training in scientific management shops are generally adapted to this end.

The writer does not wish to be held as attempting to condemn scientific management on this score. It may be that breadth of training in the shop is of necessity under modern conditions becoming progressively a thing of the past. If so, the stress which is laid by scientific management theory upon special instruction and training is in the highest degree commendable. Nor in spite of the variation which exists are the actual results to be lightly discounted. While the claims in this respect are not borne out—some of them being gross exaggerations, others positive negations of the facts—in the better scientific management shops, many workmen, no doubt, are receiving more careful instruction and a higher degree of training than is at present possible for them elsewhere. The most that can be said is that scientific management as such furthers a tendency to narrow the scope of the workers' industrial activity, and that it falls far short of a compensatory equivalent in its ideals and actual methods of instruction and training. More careful consideration will be given to this matter, however, in a later section.

6. *Time Study and Task Setting: Their Purposes, Methods and Results*

To the uninitiated or to those who accept uncritically the scientific management claims, time study is time study, always with a definite purpose, an invariable method, and with results which are in the nature of exact and, therefore, indisputable knowledge. "Time and motion study," says Mr. Taylor, "is the accurate scientific method by which the great mass of laws governing the best and easiest and most productive movements of men are investigated." "They substitute exact knowledge for prejudiced opinion and force in determining all the conditions of work and pay." The implication, borne out by other equally positive assertions, is that the task based on time study is set with scientific accuracy both with reference to the material conditions and the capacity of the workers employed, and the just demands which can be made upon them. Each workman "is assigned to a definite and by him accomplishable task," and with "due and scientific allowance for the human factor and legitimate delays." The results of time study are, therefore, not a legitimate subject of bargaining since they partake of the nature of objective scientific fact in the determination of which the prejudices and opinions of men have had no part. "As reasonably," says Mr. Taylor, "might we insist on bargaining about the time and place of the rising and setting of the sun." [1]

It is just in this connection, however, that the unbiased investigator receives perhaps his strongest impressions of the diversities of the so-called scientific management methods. Far from being the invariable and purely objective matters that they are pictured, the methods and results of time study and task setting are, in practice, the special sport of individual judgment and opinion, subject to all the possibilities of diversity, inaccuracy and injustice that arise from human ignorance and prejudice.

---

[1] The term bargaining, as used by the writer in this study, applies to that condition existing where differences arise between workmen and employers, and these are jointly considered with the view of effecting an adjustment and mutual agreement upon the questions through an examination of the facts surrounding the point or points upon which differences of opinions had arisen. Mr. Taylor seems often to use the term in a way to imply that it dispenses with the consideration of facts.

In making this statement, it is not intended to condemn time study and task setting, as such, or to deny that under certain special conditions, to be noted later, results approaching scientific accuracy are possible by these methods. Neither is it to be inferred that time study does not hold out the possibility of improvement over the current methods of task setting, nor that in some scientific management shops the methods used are not fair and the results attained are not beneficial to the workers. The statement merely characterizes the situation as it has been found actually to exist.

This practical diversity and unscientific inaccuracy in connection with time study and task setting, resulting from the injection of the fallible human factor, begins, in practice, with the purposes for which time study is employed, and ends only with the final time which is set for the accomplishment of the task or the final establishment of a scale of efficiency relative to the doing of a piece of work.

Speaking broadly, there are two main purposes for which time study may be employed. It may be used primarily for the study, improvement, and standardization of the methods of doing the work under observation, altogether without reference to a standard time for its accomplishment, or it may have for its main or sole purpose the fixing of a definite task time or efficiency scale. In the first case, for example, a job may be studied with or without the stop watch to determine whether it is properly located as to sequence in the industrial process, whether the conditions of safety and sanitation are up to the standard, whether the best available machinery is used for the purpose, with properly regulated speed and feed, whether the best tools and materials are well supplied and conveniently located, and the product handled to the best advantage; whether the worker is employing efficient methods in the most efficient sequence and what improvements in the process may be made to advantage, etc., etc. In the second case, the conditions just named are all supposed to have been fixed.

The stop watch is now used on selected workmen to determine what time is to be allowed the workers for the performance of the task or at a rating of 100 per cent. efficiency.

Great possibilities of advantage both to the employer and the workmen exist in time study employed for the purpose first named. The writer has seen examples and results of this work which commanded his unqualified admiration, and he has no hesitation in affirming that time study may thus be used to work revolutionary improvements in current industrial methods generally, without any necessary evils to workers individually or as a class.

Unfortunately, scientific management employers, in general, do not live up to the highest ideals in this connection. Some, even, do not recognize this vital distinction between time study for standardization and time study for task setting or efficiency rating. The result is that in a large proportion of the shops time study for standardization is relatively neglected. Even where this distinction is understood and its importance recognized, it is frequently ignored in practice. This is especially true of shops which turn out a variety of products, and in which the models change frequently. Here where perhaps a thousand new tasks are sometimes set within a month, ignorance or indifference to the welfare of the workers, or considerations of time and immediate economy, frequently cause tasks to be set without the preliminary time study for standardization which is necessary to insure fair and uniform conditions and results.

In general, the greatest variation was found to exist in this connection. Shops were visited where no tasks based on immediate time study were set without months or perhaps years of preliminary preparation and hundreds of time studies made on each job solely for purposes of improvement and standardization. Others were examined where the first and only timing determined the task by which any worker on the job was rated. Between these extremes, the greatest variation was found to exist sometimes within the same shop.

It is not, however, variation in the emphasis placed on the two distinct purposes of time study that chiefly impresses the impartial investigator of scientific management, as practiced. More noticeable by far are the variations in the actual methods employed in determining the time allowed for the accomplishment of tasks or for the rating of efficiency, and especially the part which fallible human judgment and individual prejudice may and do play in arriving thus at what are assumed to be objective scientific results.

In order that this matter, which is one of the vital points of controversy between scientific management and organized labor, may be cleared up, it will be necessary to describe the general process of time study somewhat in detail. The normal method of making time studies for task setting or efficiency rating—if a normal method may be said to exist where there is so much diversity—may be described thus: After the job or task in question has been standardized, it is analyzed by the time study man into its elementary parts or motions. These are set down in the sequence in which the movements or elementary operations are to be performed with spaces after each in which to record the actual time taken in a succession of tests. One or more workers are then selected for timing and instructed to do the work or job in accordance with the sequence of elementary operations or movements thus established and at a certain general rate of speed. The job is thus done, the time study man, watch in hand, observing and setting down the time taken for each element. This process is repeated until the time study man is satisfied that enough readings or performances of the operation have been observed and recorded for the purpose in hand. The successive readings or amounts of time taken in the case of each elementary operation are then studied and a final figure determined and set down which is called the "necessary time" for the element or the time which "should be taken." These "necessary" elementary times are added and the total is the "necessary time" for the whole operation. This, however, is not all the actual time allowed. To it are now added one or more "allowances." If the operation is strictly a hand job, one allowance only will probably be made to cover "fatigue," "necessary delays," "human necessities," and possible errors in the work of the observer. If the work is a machine job, a second allowance may be made to cover machine delays, breakdowns, etc. The final time set as the result of the study, to stand as the task time, or as representing 100 per cent. efficiency, is the "necessary time" plus the allowance or allowances. The whole process will be made clear by reference to the form on page 45.

This is the general process of time study which is assumed to produce an objective scientific result—to set a task time whose scientific accuracy and justice are not open to dispute, the time being, therefore, not a subject of bargaining, because "it substitutes exact knowledge for prejudiced opinion in the setting of the task."

The slightest consideration, however, should convince anyone that, except possibly in the case of a machine job where the human element is practically negligible, e. g., where speed is almost purely a matter of machine capacity and over-speeding of the workman is impossible under any circumstances, the process just described is incapable of producing the accurate result claimed, and that, throughout, process and results are peculiarly dependent on human judgment and prejudice.

To make this clear, let us consider for a moment the nature of an objective scientific fact, and the conditions necessary to its establishment, and then apply these tests to the process of time study and task setting. An objective scientific fact is obviously something which exists quite independently of the observer. His sole function is to discover it. It is not subject to change by the will or judgment of the observer, and remains the same whoever is engaged in the process of observation. Judgment indeed may be exer-

Form X.Y.Z. 45a

TIME STUDY

TIME STUDY NO...... ....Sheets Sheet.....

Article................................ Symbol................

Sketch or Drawing...... QUANTITY...... OPERATION......

Man.No....... Machine No....... DEPT...................

Work, Job or Order No........

TIME......A.M., P.M.

MATERIAL....... OBSERVER...... DATE................

NOTE.—The observer must exercise extreme care in making time studies to see that the *proper* sequence of operations is maintained, that all *unnecessary* operations or moves are eliminated, that proper appliances are provided (including cutting tools in sufficient quantities) and that the proper and most economical combinations of Speed, Feed and Cut are used. When time is slow, due to man's natural slow moves, note (in margin at extreme right below) what time should be for a fast man moving at his best normal speed. Have certain operations repeated if necessary to satisfy yourself that the time is correct and continue to do so until the study is satisfactory.

Sub Operations	Detailed Description of Operations, Speed, Cuts, etc.	Minutes and Hundredths			Average	Should Take
		1	2	3		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22 to 46						
	Totals carried forward...					

FINISHED.........A.M. P.M. ELAPSED TIME FOR Min.

cised in the discovery but not judgment which alters the fact itself. If the result varies with the judgment exercised by the observer and differs for each observer, it cannot by any stretch of truth be called an established scientific fact.

In the present case, the assumed objective scientific fact is the time allowed the workers for doing a definite task. It is claimed to be a scientific fact in that it is an accurate scientific demonstration of what the workers can accomplish without over-strain and exhaustion. But in order to uphold this claim it is evident that the judgment of the time study man must not enter into the process of its determination in such a way as to affect the fact itself, i.e., to fix or alter the time of the task. His function must be purely that of discovery. For if he can at any point in the process exercise his judgment in such a way as to alter the outcome, it becomes at once a matter of human opinion and prejudice, variable for each observer, just as would be the rising and setting of the sun could the will and convenience of the observer determine their time and place. Under such circumstances, all claims of objective scientific character would be lost to the results as well as all assumptions of justice resting upon such claims.

But this is exactly the case with tasks set by the process of time study which has been described. At a score of points in this process, the judgment of the employer, the time study man or the workers may be exercised so as to produce variation that will affect and alter the task itself. In other words, the time study process includes a score of factors variable with the judgment and will of those immediately concerned, variation in any or all of which acts as a determinant of the task. This is made evident by a careful analysis of the process. Such analysis shows that among the factors that may thus vary, subject to human will, are: (1) The general attitude, ideals and purposes of the management and the consequent general instructions given to the time study man; (2) The character, intelligence, training and ideals of the time study man; (3) The degree to which the job to be timed and all its appurtenances have been studied and standardized looking to uniform conditions in its performance for all the workers; (4) The amount of change thus made from old methods and conditions of performance, e. g., the order of performance, the motions eliminated, and the degree of habituation of the workers to the old and the new situation when the task is set; (5) The mode of selection of the workers to be timed and their speed and skill relative to the other members of the group; (6) The relative number of workers timed and the number of readings considered sufficient to secure the result desired; (7) The atmospheric conditions, time of day, time of year, the mental and physical condition of the workers when timed and the judgment exercised in reducing these matters to the "normal"; (8) The character and amount of special instruction and special training given the selected workers before timing them; (9) The instructions given to them by the time study man as to care and speed, etc., to be maintained during the timing process; (10) The attitude of the time study man toward the workers being timed and the secret motives and aims of the workers themselves; (11) The judgment of the time study man as to the pace maintained under timing relative to the "proper," "normal" or maximum speed which should be demanded; (12) The checks on the actual results used by the time study man in this connection; (13) The method and mechanism used for observing and recording times and the degree of accuracy with which actual results are caught and put down; (14) The judgment exercised by the time study man in respect to the retention or elimination of possibly inaccurate or "abnormally" high or low readings; (15) The method used in summing up the elementary readings to get the "necessary" elementary time; (16) The method employed in determining how much should be added to the "necessary time" as a human allowance; and (17) The method of determining the "machine allowance."

That the factors thus enumerated are not constant in practice and that the tasks thus set by time study have no necessary or objective scientific relation to what the members of a working group can or should accomplish, but are dependent chiefly upon the judgment of the time study man, the writer can positively affirm as the result of many careful observations of time studies made in scientific management shops and much analysis and discussion of methods and results with scientific managers and time study men. The justice of this conclusion can be sufficiently demonstrated by further analysis in connection with one or two of the factors involved. Take, for example, "the mode of selection of the workers to be timed and their speed and skill relative to the workers of the group." A standard task is to be set for all the members of the group to perform. But unless the time study man is to introduce the element of past experience or to rely upon his own notion of what ought to be standard accomplishment, the necessary time set for all to attain will depend wholly on the speed and accomplishment of the men whom he selects for timing on the job. But he may select the fastest men, or "good, fast" men, or average men, or men just below the average, or slow men, or any combination of these. It is all a matter of the end which he is seeking and of his judgment in picking men who can and will serve this end. If he is primarily a taskmaster, without much human understanding and sympathy, bent on securing the highest possible returns, he will select the "swifts," and if the average worker protests the task, he will be assured that it is an objective scientific result, and not subject, therefore, to dispute or bargaining. Most scientific managers and time study men claim that "good, average" men are selected for timing, but the truth is that here as elsewhere there is no high degree of uniformity. There can be no question that in some shops none but fast workers are knowingly timed, while in others it is equally certain that the average man is sought for this purpose, and, as a matter of fact, practically all the possible variations and combinations have been found in connection with this particular matter. But the point to be made is that the task set is, barring other factors, determined by what the men timed accomplish and the selecting of these men is altogether a matter of ideals and judgment. There is no objective scientific method of determining what man's speed and accomplishment when recorded will accurately represent the possible or just capacity of a heterogeneous group of workers. This can be determined, if at all, only by the trial and error method, unless indeed we are to say that the scientific task is what it can be demonstrated that any man, arbitrarily selected, can do, or that if the task can be accomplished it is not too great.

Or let us take as another example the methods of summing up the elementary readings to get the "necessary" elementary time. The actual variations here are in practice very great and are the result of the exercise of individual judgment. In some cases, all the figures secured by timing are taken into consideration. More generally, however, the time study man begins by throwing some of them out. He may thus discard what he considers to be abnormally high and abnormally low readings or he may throw out only those which appear to be abnormally high.

There is no fixed rule as to whether the one thing or the other is done or any scientific rule for determining what figures shall be considered "abnormal." The enormous variation which sometimes characterizes these figures even with the best observers[1] is sufficient indeed to indicate error of some sort, but the point above or below which error is assumed to exist is all a matter of individual judgment. Having eliminated the readings which he considers to be abnormal, the time study man now proceeds to the combination of those which remain into one figure representing the "necessary" time or the "time which should be taken" in the doing of this element of the task. Here again there is no fixed rule which is followed in practice though it is perfectly evident that any variation at this point means variation in the extent of the task set or the task time allowed. Some time study men get the "necessary" time through a simple average of the figures retained. Others try to find the median and assume that it represents the "time that should be taken." Still others plot the figures and attempt to determine the "average minima." Cases were found where faith was pinned to the most frequently recurring figure. Again, the lowest figure which occurred a certain percentage of times was selected as representing the "necessary time," and at times even the absolute minimum was thus taken regardless of the fact that this assumes the attention of the worker always to be focused. Not infrequently the results obtained by differing methods of this kind were compared with a figure set down as a check previous to the making of the time study and manipulated with reference to it. Once, a case was found where the summing-up process followed an arbitrary rule, the basis and theory of which the time study man could not explain. He "guessed" that the rule had been constructed so as to get the results which its inventor wanted.

---

[1] The following figures representing the result of successive readings for a given elementary motion were copied at random from a time study sheet in one of the most scientifically managed shops, where special stress is laid on time study, and the time study men are selected with more than usual care: 37, 55, 50, 40, 41, 56, 52, 60, 48, 64.

If space permitted, each one of the seventeen points enumerated above could be considered, and it could be shown in each case that judgment enters not only into determining the method pursued but as a determinant of the task time set. The situation is aggravated, moreover, by a practice which is coming into vogue of cutting short or completely eliminating the elementary timing of the actual operation when the task is set. There are those who make a profession of time study and who tabulate for general use the elementary results. In scientific management shops also records are kept of elementary times derived from their own time study work. These records obtained both within and without the particular shop are coming to be used in the setting of new tasks. Thus, when a new job is analyzed into its elements only those on which no previous record exists are actually timed. The "necessary" time is then determined by use of previously recorded or elsewhere determined elementary times so far as they go. It thus sometimes happens that no actual time study is made of the particular job, but the "necessary" time is determined wholly by the summation of elementary times taken from the study of other jobs or in other shops. The matter, that is to say, becomes an office process.

Now there undoubtedly exists what is sometimes known as a "shop constant," that is, a set of conditions which are peculiar to the particular shop and the particular group of workmen, which makes the time necessary for doing any particular job different from that which is necessary in some other or perhaps any other shop. It is not going too far to say that there is in some cases also a "job constant,"[1] that is to say, jobs may so differ in their general character and relations that the time necessary to perform an elementary operation common to them will differ with the different jobs. All this being true, it is evident that this curtailment of actual time study and the setting of tasks in one shop on the basis of time readings made in another introduces a further unscientific and possibly unjust factor into the time study and task setting process.

In face of such evidence, which further analysis would multiply indefinitely, it is obviously absurd to talk of time study as an accurate scientific method in practice or of the tasks set by means of it as objective scientific facts which are not possible or proper subjects of dispute and bargaining. Indeed, under the general circumstances which prevail in industry the very conception of a single task set for a whole group of workers or of an invariable task for an individual to be accomplished from hour to hour and day to day is unscientific, looked at from the standpoint of adapting the work to the individual capacities of the workers or from that of strict justice. Such tasks can be scientific only in the sense of determining the maximum accomplishment of a group or of a man. For the working capacity of different members of a group, what different individuals ought to do varies, but no more surely than that of the individual from hour to hour and day to day. There is just one case in which the claim to strictly scientific results from time study and task setting can be justified. This is where the consideration of the human factor can be practically eliminated. This case is exemplified in certain machine jobs where the output depends mainly on the speed and feed of the machine and the quality of the material, and the machine can be run at its highest capacity without danger of overspeeding and exhausting the worker. On such a job the maximum output may reasonably be considered the scientific task and what this is can be accurately determined by reference solely to physical and mathematical data. There is reason to believe that Mr. Taylor and his followers had in mind a job of this character—a machine shop proposition—when they made their claim to scientific accuracy and that they failed to realize that where the human element is introduced, as it is in all other circumstances, a new order of problem is created.

---

[1] The terms "shop constant" and "job constant" are technical phrases which may be somewhat misleading to the lay reader. The conditions to which they refer would be better described perhaps by the terms "shop variant" and "job variant." They refer to the status in one particular shop or to the character of one particular job as against any other shop or job.

The demonstration, however, of the unscientific character of time study and task setting does not at all prove that the method is necessarily impracticable or unjust to the workers. On the contrary, if the management is honestly seeking the best good of all concerned, and if the time study man is well trained, experienced, with good analytical ability, good judgment, and tact, there can be no question that time study promises much more equitable results than can be secured by the ordinary methods. Under such circumstances, it may create protective standards for the workers and act as a check on unreasonable and oppressive demands made by either side. Properly and fully applied, time study does to a very high degree substitute knowledge for ignorance in the setting of tasks. It thus opens the way for more reasonable judgments and action on the part of both employers and workmen.

But it must not be forgotten that greater knowledge creates also greater opportunities for the unscrupulous and that a method, which in benevolent and intelligent hands makes better dealing possible, may be woefully abused by the ignorant and unscrupulous, and observation proves that time study for task setting is no exception to the rule.

As a matter of fact, time study for task setting is found in scientific management shops in all its possible variations both with reference to methods and results. In some, the highest standards are maintained in regard to all the factors enumerated—all or a large proportion of the workers are timed, the largest practicable number of readings is made, cordial relations are established between the time study man and the workers, and the latter are cautioned against speeding up when being timed, and, if doubt remains, the allowances are purposely made large to cover all possible errors. Liberality of the task is the keynote. In other shops, the maximum task is just as surely sought and the method is warped to this end. The swiftest men are selected for timing, they work under special inducements or fear, two or three readings suffice, allowances are disregarded or cut to the minimum. The task or 100% efficiency is to all intents and purposes arbitrarily fixed, sometimes practically before the time study, at what it is judged the workers can be forced to do. The main use of the time study is to prove to the workers that the task can be done in the time allowed.

But consistency does not necessarily prevail even in the same shop. Under the same management, some of the jobs may be timed carefully and tasks set with care, while others are hastily studied and the tasks set little better than crude guesses. Thus, in practice, "100% efficiency" may and sometimes does mean anything from the output of the "swift" to a "fat job" even for the plodder.

There is little doubt that as time goes on general improvement and greater uniformity may be expected in ideals, technique, and the results obtained. As things are now, however, formidable elements stand in the way. Among these, two deserve some special consideration—the character and position occupied by the men who are being drawn into time study work and the practical dictates of economy.

It should be evident from what has been said that time study and task setting are among the most important, if not the most crucial factors in the scheme of scientific management. Time study plays a major part in the improvement of productive processes and in the standardization of organic and productive methods. Time study and task setting together are the prepotent forces governing the conditions of work and the welfare of the workers under scientific management. It is the time study man who determines, subject to higher sanction, the way in which work shall be performed, the speed at which it shall be done, its adaptation to the capacity of the workers, whether it shall be done under conditions which hamper or further their efforts, whether it shall stimulate, energize, and develop them industrially, or narrow, degrade and exhaust them. In short, it is the work of the time study man which chiefly determines whether efficiency shall be combined with just and humane treatment of the workers, regardful of their present and future welfare, or sought at their expense physically, industrially and socially.

This being true, the time study man is, from the viewpoint of labor, the central figure in scientific management—its vital organ and force. To perform his functions properly, to make scientific management tolerable to labor, he must be a man exceptional in technical and industrial training, a man with a broad and sympathetic understanding of the workers as well as of the economic and social forces which condition their welfare, a man of unimpeachable judgment, governed by scientific rather than pecuniary considerations, and, withal, he must occupy a high and authoritative position in the management. For if he is to set tasks that will not cause nervous and physical exhaustion, he must not only have an intimate personal knowledge of the work to be done, the special difficulties it involves, the qualities required to do it well, the demand which it makes on strength, skill, ingenuity and nervous force, but he must also be able to recognize and measure nervous disturbance and fatigue and understand and deal wisely with temperament. If he is to set tasks which will always be fair and liberal, he must understand and know how to discount all the effects of current variations in machinery, tools and materials, in human energy and attention. If he is to safeguard the lives and health of the workers and their general economic and social welfare, he must be an expert in matters of sanitation and safety, and have a broad and deep understanding of economic and social problems and forces, and, finally, if he is to make all this knowledge count, he must be able to establish the standards warranted by his study and judicial weighing of men and facts and to protect these standards against infringement and displacement. All this and more, if the claims of scientific management relative to labor are to be generally fulfilled.

But as things actually are, this emphatically is not the type of man who is habitually engaged in time study work, and who is being drawn into it, nor does the time study man of the present occupy this exalted position in the hierarchy of scientific management. The best men in this work are perhaps technically qualified, but, so far as the observation of the writer has gone, the best of them are technicians with little knowledge of the subject of fatigue, little understanding of psychology and temperament, little understanding of the viewpoint and problems of the workers, and almost altogether lacking in knowledge of and interest in the broader economic and social aspects of working-class welfare. The bulk of the time study men encountered were immature men drawn from the shop or from college. They were expected to get their knowledge and training in all the matters enumerated above through the actual work of time study and task setting. In the majority of cases encountered, it was not considered essential that they should have had any special training in the particular industry. A man who had worked exclusively in the machine shop was considered competent after a few weeks or months of contact and trial experience to set tasks in a cotton mill. Sometimes, previous industrial experience of any kind was not considered necessary. Analytical ability, good powers of observation, a sense of justice and tact were the chief qualities emphasized as essential for a good time study man. Rarely, if ever, was anything said of technical knowledge concerning fatigue, psychology, sanitation, safety, and the broader problems of industrial and social welfare. Indeed, time study and task setting were almost universally looked upon as primarily mechanical tasks in which the ability to analyze jobs and manipulate figures rather than broad knowledge and sound judgment were regarded as the essential factors. Naturally, therefore, the time study men were found to be prevailingly of the narrow-minded mechanical type, poorly paid and occupying the lowest positions in the managerial organization, if they could be said to belong at all to the managerial group. Nor does the situation seem to promise much improvement. For the position and pay accorded to time study men generally are such as to preclude the drawing into this work of really competent men in the broader sense. Aside from a few notable exceptions in the shops, and some men who make a general profession of time study in connection with the installation of scientific management, this theoretically important functionary receives little more than good mechanics' wages, and has little voice in determining shop policies. The start is often made at $15.00 per week. A good time study man, according to current standards, can be had at from $75 to $100 per month, and $125 per month is a rather high rating for experienced men, if the statements of scientific managers are to be trusted. In fact, the time study man, who, if scientific management is to make good the most important of its labor claims, should be among the most highly trained and influential officials in the shop, a scientist in viewpoint, a wise arbiter between employer and workmen, is, in general, a petty functionary, a specialist workman, a sort of clerk, who has no voice in the counsels of the higher officials. There are, of course, exceptions to this general rule, but taking the situation as a whole, the quality of the time study men actually setting the tasks in scientific management shops and the position which they occupy are such as to preclude any present possibility of the fulfillment of its labor claims.

A less widely effective but perhaps more potent and permanent bar to adequate time study and the setting of tasks which fulfill the requirements of fair dealing and justice to all the workers is found in the demands of economy. To make a thoroughgoing study of a simple job so that the task may be set right with reference to the capacity of the workers engaged in doing it often requires a good deal of time study. Moreover, in connection with many operations performed by a group of workers, the conditions frequently vary not only for the whole group but between workman and workman engaged in it. A very simple illustration is found in paper cutting. With all the machines and appurtenances in perfect working order, the effort and time required to cut a ream of paper varies with every size of sheet to be cut. But they vary not only with the size, but with the quality of the paper, and in the ordinary printing plant many different qualities are cut. Obviously, if fair tasks are to be set, time studies must be made for each size of cut. But this alone will not suffice. If tasks are to be accurately set and to be not only accomplishable, day in and day out, but to maintain relative justice among the workmen, time studies must be made and separate tasks set for each quality of paper. Otherwise, no workman will be sure of continuously attaining the task, and at the same time some will have tasks easy of accomplishment while others, struggle as they may, will not be able to come up to the standard. This situation becomes vitally important when it is remembered that under current methods of payment employed in scientific management shops, the worker's income is relatively high or low according as he succeeds or fails to make the task. But to set tasks for both size and quality would ordinarily mean a number of time studies in connection with this one operation quite impossible with any consideration for economy.

Or take another illustration, the job of the make-up man in the same industry. It is quite economical to make time studies and set tasks thereon where straight-run work is concerned, but where cuts of various shapes and sizes are used, the time required to make up a form may have a hundred variants. But economy forbids the careful study of each of these in the setting of the make-up task.

These illustrations find their counterparts in all industries where materials vary in quality and where products of the same general kind made with the same machinery and tools are not strictly identical.

Under such circumstances, what is classified as one job varies from day to day and from one workman to another. A single task time set on it means that the workman is not "paid according to his efficiency" but today gets high and tomorrow low wages for the same work, and that of two workmen at any time, one receives high reward and the other low for the same expenditure of skill and energy. Where the irregular work, as in the case of the last illustration, requires a higher than ordinary skill, the situation may be still more aggravated. It requires a skilled man to make up forms where cuts are used, but a less skilled workman can do the straight-run work. The skilled man may thus find himself failing to make the task while the less skilled working by his side turns out the work required and receives the bonus reward. Such conditions naturally lead not only to dissatisfaction but to poor workmanship, and these results cannot be altogether eliminated by a higher day rating for the more skilled man.

Other cases where the element of economy interferes with adequate time study and careful task setting are: orders for specialties not likely to be repeated, stock orders, but with variations or special attachments, rush orders on new lines of product, orders which require considerable experimentation or a special degree of judgment and skill in lay-out and work. In all such cases, tasks must be set, if at all, with little or no actual time study if delay and expense are not to spoil the market and eat up profits. In short, only in connection with standard products, requiring only moderate skill and judgment in lay-out and work, does economy seem to allow of adequate application of the time study method. Its natural sphere seems to be routine and repetitive work.

So long, therefore, as industry continues to be the complex and diversified thing that it is, including in its range unskilled, routine and repetitive operations and work which requires on the job the highest exercise of manual skill and judgment, so long as it is in flux, developing continuously new products, new modes, new machinery and processes, and so long as productive concerns are required in order to survive, to adapt themselves quickly to fluctuating market demands, this element of economy will without doubt continue to operate in a way to limit the legitimate scope of time study and task setting and will retard the uniform development of ideals and technique in this connection.

The foregoing discussion has brought out incidentally the general limitations to the legitimate application of time study and has suggested the difficulties attendant on attempts to set tasks by this method which shall result in fair conditions at all times to individual workers and as between worker and worker. The better class of scientific managers recognize these limitations and difficulties and attempt to meet them in such a way that the interests of their workers shall not be sacrificed. Thus, on jobs which are subject to great internal variations, on rush orders involving new work, on specialty work and highly skilled operations, they make no attempt at time studies for task setting, but pay the men by the day. Some even refrain altogether from time study for task setting where the industry is undergoing rapid change or the cycle of operations is very short. Recognizing the difficulties which are bound to arise from poor and variable materials, machine trouble, tasks connected with the same operation varying in difficulty, and many other current exigencies, they endeavor to set the task so liberally that it can be made under all ordinary circumstances with something to spare when all goes right. They attempt to do justice to the higher skilled workman, forced to forego the bonus, by a higher wage rating, and try to guard the bonus workers against loss, due to difficulties and delays over which they have no control, by allowing them to take out wait or delay cards which entitle them to the day wage without prejudice to their task time rating until they can go on under usual conditions.

With the best intentions, however, the inherent difficulties of the system are not met satisfactorily. Men, especially if highly skilled, on day work permanently are apt to complain when others, perhaps less skilled, pocket several dollars a week above their day rates, even though their own earnings aggregate as much or more; those who are shifted, today on bonus, tomorrow on day work, object to the uncertainty of their income; liberal task setting does not wipe out the sense of injustice when one man has been forced to work as hard, barely to make the task, as another who passes beyond it and secures considerable extra reward; day rating during delays and in absence of bonus work does not compensate for lost earnings at the higher rate. Most carefully and liberally applied, therefore, time study and task setting seem bound to be a source of considerable injustice and irritation to the workers. When we descend in the scale to employers, and they are not wanting, who have little consideration except for the returns or who look upon time study and task setting as a sort of religion—employers who, if economy forbids careful work, will still go through the motions and set the tasks anyhow, even though they are the crudest of guesses, with no carefully worked out compensation for obvious unfairness—all these sources of uncertainty and injustice are exaggerated with the added possibilities of over-strain, exhaustion and underpayment. With such possibilities in view, neither in the present nor in the near future is there any reasonable ground for the sweeping labor claims of scientific management based on time study as a method of task setting and efficiency rating.

7. *Rate Making, Modes of Payment and the Maintenance of Rates*

Closely interlocked with time study and task setting, both in the facts involved and the claims made, are the methods of determining wage rates and the modes of payment employed by scientific management. These matters together constitute the storm center of the controversy between scientific management and organized labor. Our discussion must, therefore, continue for a time to be somewhat detailed, and at some points may seem to overlap what has gone before.

The current methods of determining and paying wages are, according to Mr. Taylor and his associates, unscientific, unjust and destructive of efficiency. Simple payment by the day, especially where union dictation prevails, is, in effect, the payment of "positions" rather than of men, affords little or no incentive to the individual for the exercise or development of efficiency, puts a premium upon soldiering, and causes the strong and willing to be held back and demoralized by the weak and unwilling. The piece-rate system also, as ordinarily established and administered, falls under the same general condemnation. It has no scientific basis, but is determined by bargaining; it fails thus to furnish a just basis of payment as between man and man or a just division of the product between employers and workmen; it stimulates, therefore, mutual suspicion and distrust and leads, on the one hand, to limitation of output and soldiering, and, on the other, to limitation of earnings and the arbitrary cutting of rates. It is a prime purpose of scientific management, according to its highest authorities, to avoid these evils and to secure the full coöperation of the employees in the development of productive efficiency, through scientific rate making and modes of payment that shall remove mutual suspicion and distrust, furnish each individual with an adequate incentive to efficiency, guarantee justice to each and all in the division of the product and at the same time guard the worker from overspeeding and exhaustion and the degradation or elimination of reasonably efficient and willing men. That scientific management has succeeded in attaining these ends is the claim made by Mr. Taylor.

In the discussion of scientific management in this connection, two distinct matters are presented for consideration. Systems of wage payment generally, beyond the uniform payment by the day, week or month, and simple piece rates, involve two elements—the base rate sometimes called the "day wage," which constitutes for any group of workers the minimum earnings or indicates the general wage level for that group, and added "efficiency" payments which are supposed to represent special, additional rewards for special attainments. These two elements of wage payment are relatively independent in their mode of determination and effects. Each, therefore, should be considered on its own merits in judging the wage claims of scientific managers.

The base rate is usually a payment per hour or per piece common to an occupation, operation or group of workers. If it is to be scientific and just according to our commonly accepted standards of judgment, it must be exactly equal to the value of the product created thus by the worker, or it must reward all workers in exact proportion to the skill and energy which they expend. That is to say, the base rate fixed for group A, who may be blacksmiths, must be exactly proportioned to the value which this labor creates as against the value contributed by the capital employed, and must differ from the base rate of group B, say, cotton spinners, or group C, school teachers, just in proportion as the skill and energy expended in blacksmithing differ quantitatively and qualitatively from that expended in cotton spinning and school teaching. Viewed in this light, one will seek in vain for any scientific methods devised or employed by scientific management for the determination of the base rate. Close questioning brought out no pregnant suggestion as to how the relative claims of capital and labor might be justly determined. It was claimed by some that the relative skill and energy employed in closely allied trades could be determined by comparative elementary analysis of the movements involved. But those who held to this view were forced to admit that where skill is a vital factor this method breaks down, that there is no scientific mode of comparison between different trades where the expenditure of effort differs qualitatively. As a matter of fact, the problem here presented would seem to be altogether new and strange to the majority of scientific managers, and by the best of them it is only vaguely comprehended. Most of those who are aware of it at all are possessed of a naïve faith that in some mysterious way competition, unhampered by the "unnatural" efforts of labor unions, works out a just adjustment of absolute and relative base rates. That is to say, scientific management in this connection accepts consciously or unconsciously an abandoned theory of economists as a common sense proposition, and practically on this basis rears its claims to scientific accuracy and justice in the establishment of wage levels. The point may seem overemphasized until it is remembered that inaccuracy and injustice in the base rate invalidate the claims to accuracy and justice based on the modes of payment employed. For efficiency rewards are reckoned in terms of the base rate. In justice, however, to the better-informed class of scientific managers, it must be said that no support is given by them to the Taylor claims in this regard.

When it comes to the actual setting of base rates, practically no consideration is given to any theory of scientific accuracy and justice. The rates are fixed almost universally with reference to the prevailing wage levels of the region. Generally, so far as the writer could discover, the attempt is to conform to the current rate. In several cases, higher rates were set with the avowed purpose of attracting the better workman. Instances were not wanting, however, where minima had been established considerably above the normal for the region because of a feeling that prevailing rates were disgracefully low, and of a desire to raise them generally. Cases exist of attempts to lower the union scale and, as it will be seen later, scientific management methods, per se, have a tendency to shift workers into lower-paid grades, and perhaps to lower many of the ratings. Where current rates for the particular job are lacking, that is, where scientific management through time study analysis creates new tasks, the new base rates seem to be determined partly by analogy and partly by the competitive wage that can be commanded by the class of workers who are to perform the new tasks.

A significant fact in connection with the scientific management claim of justice in rate making is that the rates for women relative to those of men have, in general, not been altered in such shops. This matter was raised on several occasions with scientific management employers without arousing any apparent sense of injustice. Indeed, the writer was informed by one very influential leader that in this connection "there is to be no nonsense about scientific management." "If by better organization and administration, what is now regarded as man's work can be done by women, women will be employed and women's wages will be paid."

The attempt to throw the glamour of science about the base rates fixed has called forth the charge by trade unionism that scientific management tends to fix wages at their present low level despite the progressive advancement in the cost of living. There seems little, however, of practical validity in this idea. Scientific management shops seem as ready as others to raise the rates as the wage level generally advances. The fact is that in practice there is nothing scientific or out of the ordinary in connection with this whole matter.

When we leave the subject of base rates and turn to the modes of payment devised by scientific management, relative uniformity at once gives place to bewildering diversity with respect both to methods and results. Each of the leaders, Mr. Taylor, Mr. Gantt and Mr. Emerson, has worked out his own particular payment scheme for satisfying the demands of efficiency and just distribution.

The Taylor payment plan is known as the "Differential Piece-Rate System." Under this system, in its simplest application, a definite task time is set for each job on the basis of an analysis of the job, including an elementary time study. Workers who fail to reach this standard are paid by the piece for what they do, just as in the case of the ordinary piece-rate system. As soon as the worker, however, attains or exceeds the task set, a new and higher piece rate becomes operative. Accomplishment relative to the standard task may be measured by the piece, the hour, the day, or the week, etc. That is to say, the task may be so much time allowed for the turning out of a piece or unit of work, or so many pieces or units turned out per hour, day or week. In the first case, the worker is paid at a low rate for those pieces on which he has taken more than the standard time allowed, and a higher rate for those which he has finished in standard time or less. In the second case, he is paid a low piece rate for the hour, day or week during which he has turned out less than the standard number of pieces, and a higher piece rate for the period or periods in which he has equaled or exceeded the task. By setting the lower piece rate below and the higher above current rates, the worker is stimulated to greater effort by prospect of both positive punishment and positive reward. As Mr. Taylor says, he is at the same time pushed up and pulled up to greater efficiency. An example will make clear the general character and operation of the system. Suppose current piece rates for a given operation are 5 cents per piece or 25 cents per hour for 5 pieces. Under the differential piece-rate system, a standard task of 10 minutes per piece or 6 pieces per hour might be set by time study. Two rates would then be established. Where the worker takes more than 10 minutes to the piece, the lower rate might be 4 cents per piece or 20 cents per hour for 5 pieces turned out, while the rates where the worker takes 10 minutes or less per piece might be 6 cents. He would then receive 36 cents per hour where he accomplished the task and would be paid beyond that 6 cents for each additional piece finished within the hour. Thus, his hourly rate might be 42 cents, 48 cents, or even more according to his ability to beat the task. The significant feature of the system is the sudden jump in the rate and pay the moment the worker succeeds in making the task. If, for example, he turns out the piece in 10½ minutes, he receives 4 cents for it; if he can clip ½ minute from the time he gets 2 cents additional. Or if he makes 5½ pieces per hour, he gets 22 cents for the hour, while if he can crowd in the other half piece and make it 6, he will at once raise his hourly rate from 22 cents to 36 cents. The figures here representing the low and high rates are, of course, arbitrarily taken, and it is not intended to assert that in practice such tremendous jumps occur, but the principle and intent of the system are thus clearly illustrated. It is to be noted that under this system there is no fixed minimum day wage. It is evident that the prime purposes of such a system are stimulation of the workers and weeding out of the slow or unfit. This is confirmed by statements made by Mr. Taylor himself which are familiar to all students of the subject. It is hard to see how such a system can be made to harmonize with the claims that scientific management pays men in exact proportion to their efficiency and with "exact justice," for the distinctive feature of this system is a sudden large increase in reward for a very small variation in efficiency.

Mr. Gantt, apparently, very early detected this inconsistency and the possibilities of undue severity in the operation of the differential piece rate system, especially as applied to relatively unskilled workmen. He, therefore, proposed and adopted in his work what is known as the "Task and Bonus System" of payment. As interpreted by Mr. Gantt, this system rests, like the differential piece rate, upon a definite task set by job analysis, including elementary time study. It ostensibly recognizes, however, but one piece rate as applied to each job or task. The worker who makes the task does not have his piece rate of pay raised directly, but receives an additional reward in the form of a bonus. Moreover, the worker who fails to make the task is not openly punished, but is protected by what amounts to a minimum wage. However slight the accomplishment compared with the task, the worker is guaranteed the base rate or day wage which has been established for that class of work. That is, he receives as a minimum what would be coming to him if he made the task and were paid at the regular piece rate. The worker who makes the task at once receives a bonus reckoned in additional hours or fractions of an hour paid at the regular rate, and for all accomplishment above the task, the bonus pay is increased in proportion to the time saved.

Thus, suppose the standard rate set is 5 pieces per hour and the piece rate is 5 cents per piece. The standard hourly rate would then be 25 cents, and if the 9-hour day exists, the standard day wage would be $2.25. Under this system, every worker employed at this particular job or task would get as a minimum $2.25 for the day whatever number of pieces he turned out under 5 pieces per hour or 45 per day. It might be only 4 to the hour or 36 to the day, but he would still get his minimum wage of $2.25. The bonus is fixed in percentage terms. Suppose it be 30% and reckoned by the hour. Then the moment a worker makes his hourly task, i.e., succeeds in turning out 5 pieces in the hour, he is credited with a bonus of 30% or 18 minutes. That is to say, he is allowed payment at the standard rate of 25 cents per hour for one hour and 18 minutes or 32½ cents. If he beats the task and turns out, say, 6 pieces instead of 5 in the hour, the bonus pay increases proportionately to the time saved. That is, he would then receive pay at the regular rate for one hour and one-fifth plus the bonus of 30% in time, or pay for 72 plus 21.6 minutes or 93.6 minutes, which would amount to 39 cents for the hour's actual work.

As we have said, the Gantt system ostensibly recognizes but one piece rate for the job, the "efficiency" reward being in the form of a bonus of additional standard time allowed, paid for at the regular rates. If the analysis be carried further, however, and the hourly rate of the worker who makes the task be compared with the number of pieces turned out, it is seen that the actual piece rate advances above that in terms of which the payment is calculated and that with a given percentage of bonus i thereafter remains constant whatever number of pieces the worker may turn out. To make this clear, let us revert to the examples just given, where the standard task set is 5 pieces per hour, the piece rate 5 cents per piece and the bonus 30%. If, under the circumstances, the worker makes 5 pieces in the hour or equals the task, he is allowed, as we have seen, payment at the standard rate for one hour and 18 minutes or $.325. The actual piece rate paid is, then, 6½ cents instead of 5 cents. Now continuing the calculation, if he turns out 6 pieces in the hour, he is allowed pay at 25 cents per hour for 93.6 minutes or 39 cents or actually 6½ cents per piece; if he makes 7 pieces, he is paid at the regular rate for 109.2 minutes or $.455 which is again equal to an actual piece rate of 6½ cents, and so on indefinitely. In other words, when the Gantt system is carefully analyzed, it is seen to be really a differential piece-rate system but with a minimum guarantee which, on accomplishment below the standard task, has the effect of increasing the piece rates as the accomplishment falls off.

The distinctive features, then, of the task and bonus system, as worked out by Mr. Gantt, are: A definite task set on the basis of job analysis, including elementary time study; a guaranteed minimum day wage which amounts to current wages for those who fail to make the task; high piece rates for inefficient workmen, diminishing as actual accomplishment approaches the task; a sharp advance in the rate of pay per piece and the wages per hour or day at the moment of making the task; after which, the method of payment becomes in fact a straight piece-rate system.

The special virtue of the Gantt system is the guaranteed minimum day wage which enables beginners to subsist on their earnings while learning to perform the operations. Beyond this, the actual liberality of the method depends, of course, upon the task which is set and the percentage of bonus allowed. There is nothing, except the impossibility of retaining workers (which seems to count for little in fact) to prevent the task being set so high that few, if any, workers can habitually reach it, and the bonus percentage can be made so low that the extra reward amounts to little. The facts of the matter we shall note later. Liberally applied, the system is without doubt very advantageous to the poorer and to the better workers. The former get at least current day rates; the latter, who may be supposed to attain or beat the task, secure a high piece rate. But for the workers in between, those who can turn out a fairly good amount of product but who still cannot reach the standard task, the system *may be* both unjust and inhibitive of efficiency, for such workers cannot by any increase of exertion increase their wages, and the more effort they put forth, resulting in increased output, the less becomes their actual piece rate payment. Both on this account and because also there is here at the point where bonus begins a sudden large variation of payment for a slight variation in efficiency, the Gantt system, in common with the differential piece rate, definitely violates the principle of payment in exact proportion to efficiency.

Mr. Emerson objects to the Gantt system as especially rewarding the worker "only when he hits the bull's eye." He claims that men should be rewarded for all shots that hit the target anywhere within the outer circle. In other words, he wishes to avoid the sudden jump in wages characteristic of the Taylor and Gantt systems at the moment when the worker reaches a certain arbitrary standard of efficiency, and to give him special inducement and special compensation for increase of efficiency anywhere along the line above the tolerable minimum of work and output. This he seeks to accomplish by establishing an efficiency scale for each job or class of work instead of setting a single standard task, and by paralleling this efficiency scale by a minutely graded series of premiums or bonuses, beginning at what is considered the minimum that ought to be accomplished by any worker and advancing progressively as efficiency advances up to 100% of achievement after which the premium advance is constant. As in the Gantt system, the work is first classified by occupations or jobs, and a base rate or day wage—usually so much per hour—is fixed for each class of work. This base or hourly rate is received by each worker doing the given class of work regardless of his efficiency or output, and is the basis on which premiums are calculated. That is to say, the premium is a certain per cent. of the hourly wage. The hourly rate itself is determined by the current wage of the locality for the given class of work. Like the Gantt system, then, the Emerson plan begins by guaranteeing to the worker the current rate of day wages as a minimum. The efficiency scale for each class of work is determined as in the standard task under the Taylor and Gantt systems, by job analysis, including elementary time study, and to all intents and purposes 100% efficiency under the Emerson plan may be said to correspond to the standard task under the other systems. Premium payments begin somewhere above 50% efficiency or one-half the standard task, usually at 66⅔%. In other words, the worker who turns out what amounts to, say 67% of the standard task or 100% efficiency gets his regular day wages or hourly rate, plus a slight additional reward called a "premium" or "bonus." As his output advances above this, or approaches 100% of accomplishment, the day wage or hourly rate remains always the same but the premium or bonus increases not only absolutely but at a progressive rate, till at 100% efficiency, it reaches, according to the standard Emerson table, 20% of the day wage or hourly rate. Thereafter, every increase of 1% in efficiency carries with it an increase of 1% in premium, that is, 1% of the day wage, the standard hourly rate remaining always the same. The method of premium gradation may perhaps be sufficiently illustrated by reference to the following premium or bonus table used quite generally in Emerson shops.

In actual practice, there is a good deal of variation, both in respect to the percentage of efficiency at which the premium payments begin, and in the minuteness of the gradation of the premium payments, below 100% efficiency.

BONUS TABLE

Per Cent. Efficiency	Bonus	Per Cent. Efficiency	Bonus
67	.005	84	.05
68	.005	85	.05
69	.005	86	.06
70	.005	87	.07
71	.005	88	.08
72	.005	89	.09
73	.01	90	.10
74	.01	91	.11
75	.01	92	.12
76	.02	93	.13
77	.02	94	.14
78	.02	95	.15
79	.03	96	.16
80	.03	97	.17
81	.03	98	.18
82	.04	99	.19
83	.04	100	.20

For each one per cent. above 100 per cent., increase the bonus of $.20 per $1.00 of wages by $.01.

Standard hours ÷ actual hours = efficiency %.

1. A bonus is paid on the hour rate in return for production, so that if the employee produces at the rate of 100% efficiency based on a standard time as predetermined by investigation and time study, showing what the normal operative is capable of producing, he will receive the hour rate and an increase of 20% on this rate, which is his bonus for efficiency.

2. Changes in conditions, such as improved tools, special fixtures, etc., which permit of increased production not due to the skill of the employee, require a new standard.

3. The employee will receive the additional wage or bonus for approaching, equaling or doing better than a standard day's work, based on the average efficiency of the week and day rate per hour, according to the table on opposite side of card.

4. Extra time for fatigue, delays, etc., has been allowed in the standard time; therefore, no extra time will be allowed for delays due to failures of belts, repairs to equipment, etc.

The so-called actual efficiency of the worker, and so the premium to which he is entitled, is determined by comparing the standard time for turning out a given amount of work, i.e., the time which represents 100% efficiency, with the actual time taken to do the work, the formula being: Standard hours ÷ actual hours = efficiency per cent. That is to say, a man who is working at 100% efficiency is credited with delivering a standard hour's work in an actual hour of time. If he is working at less than 100% efficiency, he delivers in the actual hour less than a standard hour's work. Dividing the standard hours of work actually delivered by the actual time taken to deliver them gives the efficiency of the worker compared with 100%. Thus, suppose a job has been subjected to time study and the standard hour's work, i.e., 100% efficiency, has been fixed at 100 pieces. A actually turns out 90 pieces in the hour; B, 110 pieces. A has delivered $^{90}/_{100}$ standard hours in one hour, B $^{110}/_{100}$ standard hours. A's efficiency will be 90%; B's efficiency 110%. The premium paid workers who are 90% efficient is, according to the table here shown, 10% of the day wage or hourly rate, that paid to workers 110% efficient is 30% of the hourly rate. Assuming then the day rate for this class of workers to be 25 cents per hour, A would receive for his hour's work 25 cents plus 2½ cents or $.275. B would get 25 cents plus 7.5 cents or $.325. Under this system, the efficiency of the worker and the premium due him may be reckoned by the hour, day, week or month. Mr. Emerson advocates efficiency rating on the average accomplishment over a fairly long period of time in order, as he says, that a worker may make up on one day for low efficiency on another, and avoid the discouragement of a total loss of premium payment when circumstances within or beyond his control happen for short periods to be against him. The tendency is to rate efficiency on the basis of fairly long periods, thus simplifying record-keeping and accounting. The possible disadvantageous results from this to the worker will be noted later.

At first blush, the Emerson system seems to be liberal to the workers and to avoid the fundamental errors of the Taylor and Gantt systems, viewed from the standpoint of the labor claims of scientific management. It guarantees current wages to all workers continued in employ. It avoids at any point a great variation in payment for a slight variation in efficiency. Further analysis, however, shows that this system does not pay workers in exact proportion to efficiency, and that, in fact, the more efficient a worker becomes the less pay he gets per unit of output. The very poor worker, who, nevertheless, receives full day rates, is paid at a much higher piece rate than the more efficient man who gets a slight premium, and piece rates diminish continuously after the premium point is reached in spite of the progressive increase in their amount. This may be shown by working out a concrete example. Suppose the base rate to be 25 cents per hour, and 100% efficiency to be 10 pieces per hour. Let the premiums begin at 67% efficiency and be graded according to the Emerson table. Then, at 66% efficiency, the worker will turn out 6.6 pieces, for which he will be paid 25 cents or a piece rate of \$.0379. At 67% efficiency, he will get 25 cents plus \$.00125 or \$.25125, or at the rate of \$.0375+ per piece; at 75% efficiency the piece rate will be \$.0336+; at 90% efficiency, \$.0305+; at 100% efficiency, \$.03; at 110% efficiency \$.0295+; at 120% efficiency \$.0291+. That is, under the Emerson system, the worker, where material conditions remain constant, gets a constantly diminishing return for extra exertion while the employer stands to gain as the worker's efficiency increases, not only because of the diminishing wage rate but because of the lessened overhead per unit of product as the output increases.[1]

---

[1] Of course, where increased output is due wholly to better organization or equipment, it may result without increased exertion on the part of the worker or even with less exertion. Under these circumstances, a diminishing piece rate need carry no implication of injustice.

Still, the Emerson system may be very liberal to the worker if what is assumed to be 100% efficiency is set at a comparatively low point. This, of course, is an entirely arbitrary matter as our analysis of time study has shown. It may be, as Mr. Emerson says, "50% of the output of a fast man," or it may be 100% of this output or the output of a good, fast man, or an average man, or the average of a group or anything else according to the character and disposition of the employer and the time study man. There is no absolute 100% determined by man or nature.

Such are the systems of payment devised by the leaders of the schools of scientific management under consideration. None of them, except the differential piece rate, makes it clear that scientific management intends to purchase labor by specification. All of them definitely belie the claim that scientific management pays workers in exact proportion to their efficiency. One of them has the obvious intent of weeding out the lower grade of workers, while the other two are so constituted as to make such workers very unprofitable to the employers. Two of them may lend themselves to the exploitation of mediocre workers—those who can deliver a medium output but cannot attain to a standard task set high. All of them furnish a strong stimulus to high efficiency and output, but in themselves furnish no apparently effective check on overspeeding and exhaustion. All of them are capable of being liberally applied, but all can also be used as instruments of oppression through the undue severity of task setting or efficiency rating, for we have seen that no claim of scientific accuracy can be made in this connection, and Mr. Taylor's statement that unfairness in this respect will at once result in a falling off of the worker's efficiency, and that, therefore, employers must be fools to practice it, is not borne out by the hard facts, especially where workers are unskilled and unorganized, and Mr. Taylor, himself, has relegated most employers to the category named above.

Finally, all of the systems tend in their direct effects to center the attention of the worker on his individual interest and gain and to repress the development of group consciousness and interest. Where the work of one man is independent of that of another, the individual has no motive to consider his fellow since his work and pay in no wise depend on the other man. What either does will not affect the other's task or rates. Where work is interdependent, the leader cannot afford to slow down to accommodate his successor and the follow-up man has no motive except to keep his fellow up to the mark.

It must be admitted that these systems are admirably suited to stimulate the workers, but in so far as there may be virtue in the union principles of group solidarity and uniformity, and in so far as the systems lay claim to scientific accuracy or a special conformity to justice in reward, they must be judged adversely.

But it would be a gross mistake to assume either that no other than these methods of remuneration just described are in use in scientific management shops, or that where these methods are adopted, they are of necessity rigidly adhered to. As a matter of fact, the possible variants in modes of "efficiency" payment are many, and the actual situation presents a welter of diversity. Numerous other "efficiency" systems have been devised by minor leaders and independent systematizers, some of which have found their way even into Taylor, Gantt and Emerson shops. Students of the subject are familiar with the Halsey premium plan, and the Wier, Rowan, Cardullo and Vicar-Maxon systems, to name only a few. A considerable variety of modifications and combinations of the three standard methods described has also been found possible, and those which have proved advantageous in the eyes of particular managements or systematizers have been put into operation. At the same time, few, if any, scientific management shops have found it desirable to discard altogether the older modes of payment. Day work is almost always retained for the most highly skilled tasks and for work not easily standardized. It is also generally resorted to in emergencies, e.g., in the case of rush orders, on new models, and when breakdowns and interferences with routine work occur. It is likely to prevail in any work not yet time-studied and standardized, because of lack of time or the dictates of economy. Usually, therefore, there is a very considerable amount of it even in highly systematized shops. Straight piece work is also surprisingly prevalent, some highly commended shops showing no disposition to replace it for certain classes of work. Indeed, the unmodified and strictly applied Taylor, Gantt and Emerson systems can hardly be said to be the typical modes of payment in scientific management shops. The Taylor differential piece rate system is infrequently encountered. In most of the so-called Taylor shops, its place has been taken by some form of the task and bonus system. In one or two of these shops, highly commended by Mr. Taylor, a single piece rate system is found, based on tasks set by time study, and accompanied by a minimum guarantee for beginners which gradually diminishes as the term of service lengthens, and, finally, disappears at the end of the "apprenticeship" period. One shop paid by the piece with a profit-sharing dividend at the end of the year, graded by the class of work and the individual records of the workers. The task and bonus system is largely used, but shows a variety of departures from the straight Gantt method. A striking example is the differential task and bonus found in two of the shops studied. This appears to be a cross between the Gantt and Emerson systems. A standard task is set but bonus payments begin at, say, 80% of this task, and are graded up to the full 100% task. Different methods of reckoning the bonus have also been devised which vitally affect the outcome to the workers without apparent modification of the original task and bonus system. Thus, in some cases, the worker does not receive a bonus reckoned in hours, but is paid for the number of hours actually worked, plus a bonus on the accomplishment of the task, i.e., if the worker accomplishes a 10-hour task in 8 hours, he gets paid at the regular rate for 8 hours only, plus a bonus on the 10-hour task accomplished. This means a diminishing piece rate as the output increases above the task.

The Emerson system probably prevails more widely than the other two, and when it is installed, more fully displaces rival modes of payment. It is also apparently less subject to modification. But variations in this system and its effects are produced by varying the percentage of efficiency at which the premium payments begin, by differences in the gradation of the premiums, by variation in the amount of output rated as 100% efficiency, and by variation in the grounds for the payment or withholding of premiums.

In all the systems of "efficiency" payment, the element of quality enters with quantity into the determination of the awards to be made, and other factors may affect the results to the workman. Various supplemental additions and various causes for deductions may thus become involved in the calculations. The whole situation, moreover, is complicated, and the effects of the systems upon the wage workers are modified by bonus and premium payments, calculated in various ways and paid for various reasons to a larger or smaller number of managerial functionaries, principally gang foremen or functional foremen of various kinds. Sometimes the principle of bonus or premium payment is extended to all sorts of persons and acts. One case, even, was found where the gang foreman received bonuses varying directly with the accomplishment of the machine workers under him, while the time study man was paid bonus going up as the "efficiency" of the shop decreased.

The bonus system is also complicated in its effects by the payment or non-payment of it to helpers in gang work. In fact, once the principle of "efficiency" payments is recognized, there is an infinite number of ways in which it may be worked out and applied with results to the workers dependent entirely upon the designs of the individual administrations.

It would obviously be impossible in this study to explain the character and implications of all these systems of payment and to enter into a detailed discussion of the possible and actual effects of all the detailed variations and modifications of them. Most of the "independent" systems and most of the general modifications and combinations of the Taylor, Gantt, and Emerson plans seem to be devised so as to lower the piece rate or labor cost as the output and efficiency of the workers increase. Doubtless the detailed variations are sometimes designed to better the working conditions and wage results but doubtless, also, the opposite is often the case. To trace out the effects of the various permutations under diverse circumstances would itself require a volume. Neither is it possible in the space allowed to describe and evaluate the various combinations of payment methods actually employed in the shops visited. The purposes of this study will doubtless be sufficiently served by merely indicating some of the major conditions and results which have been found to exist, which bear especially on the claims of scientific management and the charges made by trade unionism against it.

Aside from the criticisms which may be brought to bear directly upon the modes of payment found in scientific management shops, the chief dangers to labor, exposed as it is to all the intricate complexities and possible variations of the situation just described, where several systems of payment are often conjointly employed, and the worker sometimes finds himself working now under one, and now under another, when various persons in authority may be pecuniarily dependent on the accomplishment of the individual worker and various grounds may be assigned for the payment or withholding of rewards, seem to be that the workers may not be regularly assigned to accomplishable tasks, that their work and income may be shifting and uncertain in amount and that the rates of pay may be indirectly, but none the less certainly, juggled.

Scientific management, it is true, makes a special point of claiming virtue in connection with all these matters. According to the Taylor claims, scientific management assigns to each workman a definite and, by him, accomplishable task, increases the security and continuity of employment and prevents arbitrary rate cutting.

There is little doubt in the mind of the writer that scientific management, if fully and properly applied in harmony with the Taylor methods and ideals, would do much toward attaining these ends. Careful and thorough time study for task setting, though it of necessity falls short of scientific accuracy, does tend to set up definite and known standards of accomplishment. And there is no question that the establishment and recognition of such standards have in themselves a tendency to check attempts on the part of employers to gain an advantage through arbitrary alteration of the tasks and thus the indirect cutting of the rates. If the time study is not only thoroughly and carefully done, but is liberal in its intent, it does furnish a real basis for the assignment to all workers of definite and accomplishable tasks. And if in connection with such time study, the general work of improvement and standardization, of planning and routing, and of sales organization, has been well accomplished, the possibilities of improvement in steadiness and continuity of employment cannot be denied. But, in the situation which actually exists, with its frequent neglect of adequate systematization, with time study often hastily done, or neglected, and especially with all this variation in modes of payment and shifting combinations of payment systems, there is no doubt that special opportunities exist for taking advantage of the workers with respect to the tasks set, the stability of employment and the rates actually paid for work done. That the workers do sometimes suffer in all these respects, whether from the purposeful efforts of employers or the normal effects of the systems and combinations of payment employed, the present investigation has furnished sufficient evidence. A few cases in point will be enough for illustrative purposes. It is not intended to assert that these cases are typical, or to imply that any number of scientific management shops present the conditions that make them possible or natural except where they grow directly out of time study. It is simply desired to show what may and sometimes does occur as the result mainly of modes of payment which may be employed under scientific management.

It is admitted generally by scientific managers that at the outset the average worker cannot attain the task or 100% efficiency, and so get the advantage, or the full advantage at least, of the "efficiency rewards." A certain period of instruction, training or habituation is required for this. The claim is generally made, however, that this period is short, a few days or a few weeks at the most. Where the tasks are set liberally and the workers are kept continuously at the particular operation, this should probably be true. But there is no guarantee that there will be liberal task setting, and especially in shops where production is not mainly for stock, and the character and volume of the orders shift continually, the mass of the workers cannot be employed continuously on one job or task, or even under one system of payment. Day work frequently alternates with task work and sometimes the tasks shift so that the worker is hardly habituated to one before another takes its place. It may thus happen that a group of workers may go on for months never securing enough continuous work in one particular task so that the majority of them become skilled enough to make it habitually and secure the bonus payments. Or they may no sooner become proficient in one task before another is substituted, and the process of learning must be gone through with again. Where such situations exist, it has been found difficult to secure records sufficiently accurate to warrant generalizations, but the possibility here presented is evident, and the reality of it has been proved by the examination of particular record sheets. Again, though the work may be fairly continuous on one job, the task may be set so high that months rather than days or weeks may be required to attain it, and even then only a minority may succeed in this. In one shop, highly commended by a well-known and highly respected leader of the movement, the writer was able to trace the record of a small group of workers for a period of seven months. At the beginning of this period six old workers were employed at the task, all of them habitually making the task. New workers were added to the group from time to time, seven all told. Of these new workers, all but one dropped out during the period of seven months. Most of these workers never succeeded in making the task, or made it only here and there, for a day or two at a time. Only two became proficient enough to make it habitually. One of these dropped out early. So that at the end of the seven months, one permanent task-making worker had been added to the group. The investigator was informed by the shop authorities that this group had nothing about it that was exceptional. In the cases just cited, the workers who failed to make the task were paid at day rates. In one sense, therefore, they cannot be said to have suffered. In view of such instances, however, and the possibilities thus presented, the claim that scientific management assigns to each worker a definite and by him accomplishable task must be taken with considerable reservation. Moreover, it is to be kept in mind that such workers are not paid in exact proportion to their efficiency since the nearer they approach to the task without making it, the lower their wages become, reckoned in piece-rate terms.

Generally also, and especially in shops of this kind where the character of the product varies greatly and work is done mainly on special orders rather than for stock, the systems of payment devised by scientific management seem to work directly against stability and continuity of employment. Not only must there be a strong tendency to weed out the less efficient workers where, as under the premium system, the piece rate diminishes all along the line with the increase of productivity, or where, under task and bonus, the workers who conspicuously fail to make the task receive very high piece rates, but under all these systems and especially under task and bonus, the workers are naturally pressed to dispose, as soon as possible, of all the work on hand regardless of what may be in sight for the future. When work is slack there is little chance for them to "nurse the job," as under the day and piece-rate systems. As inducement to keep the workers hustling, the employer has not only to consider overhead expenses, but also the fact that under most of these systems letting down in individual accomplishment means a definite and known increase in the piece rate paid, and where this is not the case, the task, itself, becomes a sort of fetish. There is a strong tendency then, under all these systems of payment, to keep the workers going at top speed as long as the work lasts, and then to send them home or lay them off; or where this is not done, they are put temporarily on day work. In the one case, continuity of employment is sacrificed, in the other, stability of income.[1] Nor is it merely the employer who, under these systems, is moved to contribute to instability and discontinuity of employment, but also the workers themselves who are straining after bonuses or premiums. During the past winter of depression, the writer has thus had the opportunity of observing piece workers who were obviously nursing their jobs, while near them bonus workers were still going at the standard speed. This, however, is not always the case. The investigator has also been in scientific management shops where, in spite of the natural effects of the modes of payment, the pace had, with the full approval of the employers, been relaxed in order to tide the workers over the slack period. The modes of payment are, of course, only one factor entering into the determination of security and continuity of employment under scientific management. Further consideration of this matter must, therefore, be reserved for separate treatment.

---

[1] The writer, in making this statement, means to imply nothing as to the social justice or injustice or desirability of this situation.

The matter of rate cutting is also something not entirely dependent on modes of payment. These, however, with time study, are perhaps its chief determinants. It can, therefore, be properly disposed of at this point. With reference to the maintenance of rates under scientific management, a somewhat equivocal situation seems to exist. The almost universal declaration of scientific management experts and shop managers is that rates once established are never altered. To substantiate this claim, several cases were pointed out where tasks had obviously been set very low through mistake, and rates, therefore, very high, making what are known as "fat" jobs, and where, nevertheless, the original situation was maintained. It was explained that to cut even such rates would rouse suspicion among the workers and destroy the good will necessary to high efficiency generally. The writer believes it to be a fact that scientific management has fostered the idea that rates should not be cut, and that there is much in the ideals and general theory which, when fully applied, should have a tendency to improve the situation greatly in this respect, as compared with what habitually obtains in the average unorganized shop. Perhaps the chief causes of rate cutting, as things now exist, are ignorance as to the possibilities of increased production through improvements in the material equipment and the organization of the shop, and cut-throat competition resulting from the lack of exact knowledge of productive costs. In so far, then, as scientific management succeeds in showing the way to improved methods and organization and better methods of cost accounting, it promises, thus, to eliminate the chief existing causes of rate cutting. That it is making progress in this direction there can be no doubt. Nevertheless, to say that rates under scientific management are never cut and to assume that the whole influence of scientific management is in the direction of maintenance of rates would be patently opposed to the facts. Rates are rarely, if ever, cut openly in scientific management shops, but the payment methods employed, together with the methods of setting tasks, lend themselves readily to indirect cutting, and there is no doubt that what is openly decried is sometimes accomplished by indirection. Time study analysis can almost always be used to alter in some degree the nature of the task or of the product. When this has been done, a new task can be set, and a new rate established without ostensible violation of the scientific management principle of maintenance of rates, and often without the knowledge of the workmen. On the "new" task, also, a new efficiency rating may be placed and lower actual rates thus set. It is to be noted that Mr. Taylor allows for such rate alteration in his statement of scientific management claims. "Under scientific management," he says, "the rate is never cut without an absolute change in the directions governing the work and the time demanded for doing it." What constitutes an absolute change in directions or in the character of the product is capable of very liberal interpretation by scientific managers, as was proved by actual experience during the course of this investigation. The discovery through time study of an "unnecessary" motion and its elimination, the gearing up of a machine, or the increase in the number of cutting points, a slight change in the tools, jigs or materials, an equally slight change in the shape or size of the product or in the method of handling it—any of these things may be sufficient to satisfy the conditions laid down by Mr. Taylor to allow of a change in task time, without constituting a rate cut. By an extension of this method, entirely new classes of work can be readily created, unskilled tasks lopped off from skilled work and given a new and lower rating, still without cutting the rate. It is the very essence of scientific management to make such improvements wherever possible, and while good managers, who have the welfare of the workers at heart, endeavor to see that workers shall not thus be made to suffer, unscrupulous employers are not slow to take advantage of these means to demote workmen and lower actual wage rates. Herein lies, perhaps, the chief bane of scientific management from the viewpoint of organized labor. Under cover of the incentive offered by premium and bonus payments, workmen can be induced to acquiesce in changes made thus gradually in the habitual work and rates to the destruction of all union standards established or the possibility of establishing them. The different systems of payment, also, would seem to afford special possibilities and inducements for manipulating the conditions of work and the actual rates of the workers. Thus, for example, the differential piece rate and the task and bonus systems would seem to hold out special inducements to employers to keep the standard task so high that few workers can attain it, and to shift those about to reach it to new lines of work. The Emerson premium plan, where efficiency is rated on the average of the week's or fortnight's work, would make it seem profitable to shift the work when the indications were that the operative, if left to the original task throughout, would attain to a very high degree of efficiency and pile up very high premiums. Charges of this character have been made freely by representatives of labor, but this investigation has resulted in the securing of no unequivocal evidence in justification of these charges in the shops investigated. Before passing finally on this matter further investigation will be necessary.

There can be no doubt that under scientific management rates are cut. But to say positively that scientific management, on the whole, furthers the cutting of rates, is quite another matter. The fact seems clear that at this point there is a conflict of tendencies within the thing itself. There is strong inducement for scientific managers to maintain rates strictly and the honest efforts of those who deserve the name so to maintain them can hardly be impugned. At the same time, however, the greatest advance toward efficiency, for which scientific management stands, is obtained by the constant alteration of conditions and tasks through time study. Such alterations almost of necessity mean constant indirect rate cutting. Should industry cease to be in flux, i.e., should it become standardized for good and all, scientific management would undoubtedly operate as an unequivocal force tending to the maintenance of rates. As it is, with industry in flux, what amounts to rate cutting seems to be almost of necessity an essential part of its very nature.

8. The Protection of Workers from Over-exertion and Exhaustion

Scientific management, according to Mr. Taylor, guards the workers against overspeeding and exhaustion nervously and physically. It does this, we are told, with a conscious view both to efficiency and the welfare of the workers, and as the result of many characteristic devices and effects of scientific management—by standardizing equipment and performance and, thus, by tending to prevent ignorance in bidding and cut-throat competition; by substituting exact knowledge based upon a careful study of men and machines for guesswork in the setting of the task and the determination of the hours and other conditions of work; by careful studies of fatigue and the setting of the task on the basis of a large number of performances by men of different capacities, and with due and scientific allowance for the human factor and legitimate delays; by removing, thus, the suspicions of the employers that the workers are soldiering, and eliminating the need for pace setters; by turning speeders into instructors and transferring responsibility from the workers to the management for contriving the best methods of work; by removing from each worker responsibility for the work of others and for the instruction of beginners and helpers; by maintaining the best conditions for performing work through furnishing the best tools and materials at the proper time and place; by training the workers in the most economical and easiest methods of performing operations; by instituting rational rest periods and modes of recreation during the working hours, and by surrounding the workers with the safest and most sanitary shop conditions.

An ideal is here presented which, in its mere expression by the most influential leader of the new movement, constitutes a strong count in favor of scientific management. Mr. Taylor has, without doubt, put his finger upon the chief causes of overspeeding and has pointed out efficient means for safeguarding the workers against it and its evil effects. Unfortunately, investigation indicates that scientific management, in practice, furnishes no reasonable basis for the majority of these specific claims in the present, and little hope for their realization in the near future. The previous discussion has shown that, in practice, standardization of equipment and performance is frequently neglected; that time study, as practiced, falls far short of substituting exact knowledge for guesswork in the setting of the task; and that proper instruction of the workers is often lacking. It follows logically and in fact that the suspicions of the employers that the workers are soldiering are not always removed, and the apparent need for pace setters not always abated, and that speeders are not always turned into instructors; that the best conditions for performing the work through furnishing the best tools and materials at the proper time and place are not always in evidence, and that the workers are not always trained in the most economical and easiest methods of performing operations. In these matters, indeed, the utmost variation prevails in scientific management as in other shops. Several admirable cases were found with respect to all these matters, but shops were not wanting where the management exhibited the utmost suspicion of the workers, referring continually to their disposition to "beat the time study man," where the time study was obviously based on the work of speeders and all sorts of inducements were offered for pace setting, where instruction and training of the workers was emphasized by its absence, and where the general conditions of work were much in need of improvement. There remain, then, in this connection but a few of Mr. Taylor's specific claims for discussion.

The first of these relates to the hours of labor. Mr. Emerson asserts that scientific management has nothing directly to do with this matter, that this is a moral question. The facts secured in this investigation seem to show that, practically, scientific management has not materially affected the length of the working day. Aside from shops where the management was evidently imbued with a strong moral sense, the hours of labor in scientific management shops were those common to the industry and the locality. Theoretically, perhaps, cogent arguments could be brought forward to show wherein diverse factors in scientific management tend both to the lengthening and the shortening of hours of work. But for present purposes, it is sufficient to let the facts speak for themselves.

A much more definite issue is brought up by Mr. Taylor's claim that scientific management guards the workers against overspeeding and exhaustion through careful studies of fatigue and the setting of the task on the basis of a large number of performances by men of different capacities and with due and scientific allowance for the human factor and legitimate delays. It has been pointed out already in the discussion of time study that tasks are set in all sorts of ways, with reference to the men chosen and the number of performances timed. There is no general rule. And it was also demonstrated that no scientific method has been developed for the making of human allowances, and that these are sometimes very liberal, but sometimes also unduly curtailed. It must be admitted, on the other hand, that scientific management can and often does go far, through the study of machinery and the careful observation of the on-going process of production, toward the establishment of proper allowance for legitimate delays, not connected directly with the human factor. When we come, however, to the matter of fatigue studies and their connection with speeding and exhaustion, Mr. Taylor's claim seems to break down completely. No scientific fatigue studies were found taking place in the shops, and the time study men employed, who should be charged with such studies, seemed, in general, to be quite indifferent or quite ignorant in regard to this whole matter. Fatigue studies, apparently, are not made when the tasks are set, and if, afterwards, complaint is made, the classical method of dealing with the subject is to "demonstrate" to the worker that the task can be done in the time set. Efforts to discover from scientific management experts proper methods for studying fatigue brought out only vague replies. Were it not for certain examples cited in scientific management texts, there would seem to be no grounds for crediting it with any scientific aspirations in this connection. This does not mean that no attention to fatigue is given in scientific management shops. Cases were found where the health and energy of the workers were carefully observed and attempts were made to adapt the work to their condition, but the methods employed were the rough and ready ones of common sense observation.

Where standardization and instruction are not properly carried out, it is obviously out of place to talk of transferring from the workers to the management responsibility for contriving the best methods of work, and removing from each worker responsibility for the work of others and for the instruction of beginners and helpers. Doubtless, scientific management shops, as a whole, are more advanced in these respects than the ordinary run of establishments, but there are those where the worker contrives much that is credited to the management, and where beginners and helpers are largely or wholly dependent on their fellow workers for suggestions and assistance.

Rest periods and modes of recreation during the working hours have been tried out in some scientific management shops and abandoned. They are a regular institution on an extended scale in one shop visited by the writer. Special cases were encountered elsewhere, but managers, in general, apparently do not even entertain the idea of their institution.

Finally, scientific management does not always surround the workers with the safest and most sanitary shop conditions. The writer was unable to secure accident statistics sufficiently comprehensive to warrant a generalization based on them as to the effect of scientific management in practice on the safety of working conditions, and a projected comparative health examination of employees was found impracticable for lack of a sufficient number of subjects suitably situated. The writer was forced, therefore, to depend mainly on observation and questioning rather than on scientific data both as to safety and sanitation. In general, scientific management shops seem to be good shops as shops go. The introduction of the system has the tendency without doubt to clean the shop up and to improve the conditions of belting, machinery and arrangement of material equipment generally. All this is in the direct line of efficiency and safety. Several very notable examples of excellence in safety and sanitation were found. On the other hand, several shops visited were below good standards in these respects, and flagrant specific violations of safety rules were encountered. In general, there seemed to be two very distinct classes of shops in respect to these matters—extremely good and very ordinary.

Reviewing as a whole the evidence bearing on the specific claims relative to speeding and exhaustion, it is very evident that the main contention of Mr. Taylor is not warranted by the facts. They in no wise justify the assumption that scientific management offers any effective guarantee against overspeeding and exhaustion of workers. The writer has a strong impression that scientific management workers, in general, are not overspeeded, but Mr. Taylor's challenge to show any overspeeded or overworked men in scientific management shops is very easily met. The situation, in this respect, varies much with the industry. Some instances of undoubted overspeeding were found, particularly in the case of girls and women. But these instances do not warrant a general charge. On the other hand, there appears to be nothing in the special methods of scientific management to prevent speeding-up where the technical conditions make it possible and profitable, and there is much in these methods to induce it in the hands of unscrupulous employers.

9. Opportunities for Advancement and Promotion

A great deal is said by Mr. Taylor and his associates of the opportunities offered the workers under scientific management for advancement and promotion. The way is opened for all of them to become "first-class men." They are stimulated to this by the systems of efficiency payment which furnish immediate rewards for increased or improved output. The record of each man is known to the employer so that no one can be held back by prejudice or favoritism. Functional foremanship creates many new and advanced positions not heretofore within the reach of shop workers. The way to the top, therefore, is always open for the man of energy and ability.

The picture is an attractive one, but, in fact, is blurred by several facts and circumstances. In the first place, as we have seen, scientific management often fails in the development of functional foremanship, and in the elimination of favoritism. Secondly, it tends to create a multitude of new tasks on which less skill is required and lower rates can be paid; has developed no efficient system for the placing or adaptation of the workers; is inclined, in practice, to regard a worker adapted to his work and rightly placed when he succeeds in making the task; tends to confine the mass of the workmen to one or two tasks, and has afforded little opportunity, therefore, for the discovery and development of special aptitudes among the mass. Moreover, careful record-keeping and the knowledge which it conveys to the management have their disadvantages as well as advantages, looked at from the viewpoint of advancement. The employer is loath to take a worker from a task where he is making a high efficiency record, and the man or woman whose record is not good is more surely destined to a less skilled and perhaps narrower task. The fact is that scientific management, in practice, has the tendency to divide the workers into two unequal classes—the few who rise to managerial positions, and the many who seem bound to remain task workers within a narrow field. In this, it does not differ essentially from the ordinary modern industrial organization based on machine production, except that perhaps the differentiation is more quickly and surely attained. This, of course, depends on the degree to which and the accuracy with which the principles and methods are applied. In this, as we have seen, there is an extreme of diversity.

Granting, however, that scientific management does not and cannot create advanced positions for the mass of the workers, and often fails to make of them "first-class men," even in the narrowest sense of the term, it is argued that it tends to recruit the higher positions from within the shop and more surely to detect and reward special merit through the close association that exists between the management force and the wage workers, and the rewards which it offers for meritorious suggestions. There is no doubt a great deal of truth in this argument when scientific management is ideally applied, and, in practice, the writer believes it to be a fact that the office and managerial staff is drawn more largely from the shop workers in scientific management shops generally than in ordinary establishments. Often, however, this is not the case; the minor functionaries, especially time study men, being drawn largely from sources outside the shop and the industry.[1] Even when it is true, the advantage to the mass of the workers is sometimes more apparent than real, the managerial material being drawn from a special class of workers trained for this end from the beginning. Moreover, while the development of functional foremanship does cause an intermingling of minor officials and workmen in their regular duties, there is a good deal of nonsense talked about the close touch which exists between the managers and the men. From recent magazine articles, one might be led to believe that the "front office" is the habitual resort of workmen in trouble or with suggestions to make. This has not been the experience of the investigator. The front office may always be open, but workers rarely take advantage of the fact for reasons that will presently be explained. There is a great deal of exaggeration, too, in statements made concerning special rewards for usable suggestions. Few of the shops make any systematic rewards of this kind and where this is the case the awards are usually trivial and may be very inadequate compared with the real value of the suggestions to the management. The writer saw in one shop an automatic machine invented by a workman which did the work of several hand workers. "Did he received any reward?" was the question asked. "Oh, yes," came the answer, "his rate of pay was increased from 17 to 22 cents an hour." Instances of this kind could be multiplied.

On the whole, it seems reasonable to conclude that, fully and properly applied, scientific management more surely and speedily separates the efficient from the inefficient workers, and affords speedier and more certain promotion and advancement to the former than management of the ordinary kind. It cannot, however, greatly enlarge the field for promotion compared with the great number of the workmen, and, in practice, the methods of promotion and advancement vary greatly in character and merit with the individual shop management.

---

[1] It is, of course, desirable that time study men should be men of broad training and experience. See pp. 54-57.

10. *The Modes of Discipline*

The methods and severity of discipline supposed to be characteristic of scientific management have come in for an immense deal of acrimonious criticism from the representatives of organized labor. Unnecessary managerial interference by a host of petty officials present in the shop is assumed by them to be applied at every point of the work and at every moment of the day. A multiplicity of new offenses is supposed to be created by task setting and the intricate modes of payment, and fines and docking are pictured as falling upon the workers at every failure to meet the severe tests and intricate arrangements of the system. Mr. Taylor, on the other hand, and scientific managers generally, claim that scientific management lessens the rigors of shop discipline mainly because each worker is set to a simple and definite task, and is stimulated by the method of payment to do his best in the prospect of individual gain. Under these circumstances, it is urged that tardiness, irregularity, soldiering and poor work are automatically regulated, the officials are relieved from the necessity of personal supervision, threats and punishments in order to keep the individual up to the mark, and are free to become helpers and instructors. Shop discipline in the old sense is thus practically eliminated.

In theory, the scientific managers would appear to have the best of the argument, and the writer was agreeably struck by the absence, in practice, of rough and arbitrary disciplinary authority. When the tasks were liberally set, the workers were found generally operating without special supervision except where instructions or assistance were needed. Deductions were indeed made for poor work and destruction of materials, and punishments meted out for ordinary breaches of discipline, but in the better class of shops apparently with no greater and perhaps with less than ordinary severity because of the dependence placed on the stimulating prospects of efficiency payments and the necessity for keeping the workers hopeful in order to reap their full benefits.

Shops were found, however, where the tasks were set high, and the driving principle prevailed. Here supervision was more intensive than that found in the ordinary establishment. The individual worker who was behind in his task was kept constantly reminded of the exact extent of his demerit, and punitive devices were multiplied to insure his promptness, his regularity and the quantity and quality of his performance.

In general, it would seem that scientific management does lessen the rigors of discipline as compared with other shops where the management is autocratic and the workers have no organization and no voice in determining the conditions of work and the disciplinary code. On the other hand, it creates the possibility of great disciplinary severity and refinements. Much depends upon the character of the industry, the competitive conditions, and the spirit of the individual management. This fact lays it open, perhaps, to legitimate union criticism as uncontrolled from below, though the evidence produced by this investigation as to the actual conditions favors, on the whole, the scientific management contention.

11. Methods of Discharge and the Length of Service

With respect to discharge and the length of service, the study in hand has brought out nothing to distinguish scientific management as unique, but much to indicate that it has developed in practice no consistency of methods, results or perhaps even tendencies. While discharge is generally an act of managerial discretion, uncontrolled and uninfluenced by the body of workmen, its grounds and the specific authority for it vary from industry to industry, and from shop to shop. Where a separate labor bureau exists, its chief official is generally charged with a review and recording of the attendant circumstances, but he rarely has any final authority. This sometimes rests with the superintendents, sometimes with the foremen.

It was generally declared that the discharged workman has a right of appeal to the highest shop authority, and that as the result of such appeals reinstatements often occur. But in general, superintendents seem chary of interfering with what has been the prerogative of the gang foreman. They may assign the workman to another department, but it would appear that he is rarely put back into his old position without the consent of the foreman in charge.

The grounds of discharge seem to be those current in ordinary shops, but apparently more attention is given to the workers' productive record. This tends perhaps to render the efficient workman's position more secure, but more speedily weeds out the inefficient. The more careful keeping of records, especially in regard to the worker's former employment and character, doubtless tends also, as the unionists declare, to the development of something resembling a blacklist, but this affects hiring more than it does the matter of discharge. That the change in methods, however, due to time study, results sometimes in the elimination of whole classes of workers, the evidence proves, as will be shown in a later section. Leaving this matter aside, the extent of discharge seems to depend here as elsewhere on industrial conditions and the motives of the particular management. That men are always thrown out as soon as they have passed their prime was disproved by the presence in several shops of old men far beyond their period of greatest usefulness. Many scientific managers claim that average length of service is longer in their shops than elsewhere and that the yearly turnover of labor is less. To support these claims, considerable statistical material was collected, but in few cases was it possible to secure statistical evidence broad enough or going far enough back in the history of shops to afford a safe basis for generalizations as to the effect of scientific management. Enough data were secured, however, to show that in respect to length of service and labor turnover, the greatest variations exist in scientific management shops as in those outside, dependent mainly on the industry and the general industrial conditions. Annual labor turnovers as low as 10% were claimed and as high as 100% or over were admitted. As we shall see later, however, the characteristic methods of scientific management tend to make possible the very quick replacement of the wage-working force. The whole matter, however, is one in which neither management claims nor union complaints seem susceptible of proof except that the unions seem to charge legitimately that discharge is generally a matter of arbitrary managerial authority.

12. *Scientific Management and Industrial Democracy*

Not less important than the controversy that centers about time study and the modes of payment employed by scientific management is that which concerns its general democratic or autocratic character and relations to the workers. Organized labor declares that scientific management is essentially autocratic—a reversion to industrial autocracy, which forces the workers to depend upon the employers' conception of fairness, and limits the democratic safeguards of the workers. It tends to gather up and transfer to the management all the traditional knowledge, the judgment and the skill of the workers, and monopolizes their initiative and skill in connection with the work; it ordinarily allows the workmen no voice in hiring or discharge, the setting of the task, the determination of the wage rate or the general conditions of employment; it greatly intensifies unnecessary managerial dictation and discipline, tends to prevent the presentation and denies the consideration of grievances, and tends to increase the number of shop offenses and the amount of docking and fining; it introduces the spirit of mutual suspicion and contest among the men and thus destroys the solidarity and coöperative spirit of the group; it has refused to deal with the workers except as individuals; it is incompatible with and destructive of unionism; it destroys all the protective rules established by unionism; and, finally, it is incompatible with and destructive of collective bargaining.

Mr. Taylor, on the other hand, claims that scientific management is the essence of industrial democracy. It substitutes the rule of law for arbitrary decisions of foremen, employers and unions, and treats each worker as an independent personality; it transfers to the workers the traditional craft knowledge which is being lost and destroyed under current industrial methods; lessens the rigors of shop discipline; promotes a friendly feeling and relationship between the management and the men, and among the workers of the shop or group; it gives a voice to both parties—to the workers equal voice in the end with the employer—and substitutes joint obedience to fact and law for obedience to personal authority. No such democracy has ever existed in industry before. Every protest of every workman must be handled by those on the management side and the right or wrong of the complaint must be settled, not by the opinion either of the management or the workman, but by the great code of laws which has been developed and which must satisfy both sides; both can refer only to the arbitrament of science and fact. Scientific management thus makes collective bargaining and trade unionism unnecessary as means of protection to the workers, but it welcomes the coöperation of unionism.

It is evident that we have here two distinct conceptions of industrial democracy, and that the failure of the Taylor group and unionists to agree as to the character of scientific management in this respect results largely from the fact that neither party has grasped the viewpoint of the other. Each argues the matter in terms of his own conception, assuming this to be common to both, each arrives thus at conclusions necessarily opposed to the other, and each, therefore, wonders at the stupidity or intellectual dishonesty of the other, perhaps without just cause.

Mr. Taylor conceives of the industrial situation as one in which the relations between employers and workers are governed by a fundamental harmony of interests. This being assumed, perfect equality between them and complete democracy in all their relationships is to be sought in sweeping aside the personal authority of the employer and the arbitrary rules and regulations of the workmen with all the machinery for negotiations and the enforcement of decisions created by both, and substituting in all matters the impersonal dictates of natural law and fact. It is the democracy of science as applied to industry. All that is needed to realize this is to have in the shop a corps of scientists to determine and declare to employers and workers the objective scientific facts. If Mr. Taylor's original assumption is correct and if all industrial matters touching the relations of employers and workmen have been or can be reduced to a purely scientific basis, his conception of industrial democracy is valid, and if it is adhered to by scientific managers generally, the worker has no need of unions, union machinery or collective bargaining to voice his complaints and enforce his demands in order to secure just consideration of his interests and equal voice with the employers in the determination of all matters of mutual concern.

The trade unionists, on the other hand, conceive of the industrial situation as one in which the interests of the employers and workmen are fundamentally opposed, at least as concerns the division of the product and the conditions of work that relate themselves closely to this. The employer, therefore, seeks naturally to take advantage of the worker. Individually, the latter is helpless. As one man, his voice can have no influence in determining vital decisions which affect his interest, and to raise it alone can only bring down upon him suspicions and penalties. The only way, therefore, to secure real democracy in industry with just treatment for each and all is through the organization of the workers and the establishment of definite rules and machinery for the voicing of complaints and the consideration of grievances; in short, the organization of unions and the practical recognition of the principle of collective bargaining. If the fundamental union assumption is sound in practice or if, being unsound, scientific managers do not generally hold to the Taylor conception or have failed to discover and put into practice generally methods for determining exactly what each man can or ought to do, for rewarding each man exactly according to his efficiency, and for the selection and adaptation of workers—methods, scientific in their character, uninfluenced as to the results by personal prejudice or fallible human judgment, expressions of objective fact, in short—then the conception of Mr. Taylor must for practical purposes be set aside, and the democratic or autocratic character of scientific management must be judged by the degree to which it furnishes the workers individually and collectively the opportunity of directly expressing and enforcing their viewpoint as against that of the employer, and of protecting their standards of work and pay against his possible aggression.

In considering the democracy of scientific management, then, we must first determine how far the Taylor conception is realizable and actually realized in practice, and if it appears to be a Utopian dream, however worthy it may be as such, we shall be forced to render a decision based on the degree of truth in the trade union charges.

On the fundamental question of the harmony or opposition of interests between employers and workers, the writer cannot hope to contribute anything decisive. The individual must here be left to his own judgment, which will doubtless be the result of his training and associations. It is a fact, however, that the Taylor view and his conception of democracy are by no means universally accepted by scientific managers. In this respect, roughly speaking, two general classes of managers were found—those who expressed a belief in harmony of interests and in industrial democracy, and those who, to all intents and purposes, take the trade union view that a fundamental contest necessarily exists in industry between the employers and the workers over the division of the product, and, in respect to all the conditions bearing upon this, that the workers are not only ignorant of what constitutes good industrial practice, but insatiable in their demands, and that, therefore, harmony of interests and democracy in industry are notions which it would be folly for the practical business man to entertain. Most of those even who expressed belief in the ideals of harmony and in the democratic principle were far from being willing to go the whole route and put into practice the democratic deductions of the Taylor concept. They believed in harmony of interests, they were enthusiastic about industrial democracy, they would readily consent to the workers having a voice in this, that, and the other vital matter, some of them would even let the workers decide on standards of work and rates of pay; as a matter of fact, they never did anything directly touching the workers' interests without consulting and advising with them individually or *en masse,* in short, they were thoroughly democratic, but in the end, it was generally found that the democracy of these men had a string attached to it. They would, of course, want to reserve the right of veto where the workers were governed by improper motives, too much influenced by trade unionists or manifestly wrong. The final decision must of necessity rest with the employers. That is inherent in business. In short, the democracy of this class of scientific managers usually turned out to be on analysis a species of benevolent despotism, often very worthy indeed, but far removed from the Taylor conception in its scientific purity.

But quite aside from the actual ideals held by scientific managers, the preceding discussion, especially that which is concerned with time study and task setting, the modes of payment, the selection and adaptation of the workers, the means for guaranteeing them against overspeeding and exhaustion, and the character of time study men, should be decisive with respect to the practical validity of Mr. Taylor's conception of industrial democracy, as exemplified by scientific management. Scientific management in respect to these matters has evolved no methods of determining objective scientific fact, and has established no natural laws to which both sides must or can refer for arbitrament, equally binding upon both and through which, therefore, in the end the worker is given equal voice with the employer. In all these matters, the judgment of the employer or his agent determines the outcome, where no rules or machinery exist through which the men may express and enforce their ideas of truth and justice, and the agents of the employers, the time study men, as we have seen, are usually not fitted to stand as unbiased arbiters between employers and workmen—as the unimpeachable upholders of scientific fact and law in the midst of a struggle for personal gain.

We need not then concern ourselves further with Mr. Taylor's conception of democracy in this connection. It is a noble ideal, as old at least as St. Simon, and the time may come when it will be capable of realization. Before this, however, the science of psychology must make long strides, industry must attain a much greater degree of regularity and stability than at present exists, and the type of man who is supposed to discover and voice the dictates of science—and stand thus as the just judge between employers and workers—must be very different from the present general run of time study men and task setters. The practical decision, then, as to whether scientific management is autocratic or democratic in its relations to the workers must turn on the degree to which it gives the workers power and opportunities, as compared with the employers, to express and advance their viewpoint and enforce their demands.

There can be little doubt that scientific management tends, in practice, to weaken the power of the individual worker as against the employer, setting aside all questions of personal attitude and the particular opportunities and methods for voicing complaints and enforcing demands. As we have seen, it gathers up and transfers to the management the traditional craft knowledge and transmits this again to the workers only piecemeal as it is needed in the performance of the particular job or task. It tends, in practice, to confine each worker to a particular task or small cycle of tasks. It thus narrows his outlook and skill and the experience and training which are necessary to do the work. He is, therefore, more easily displaced. Moreover, the changing of methods and conditions of work and the setting of tasks by time study with its assumption always of scientific accuracy put the individual worker at a disadvantage in any attempt to question the justice of the demands made upon him; and the assumed payment of wages in exact proportion to efficiency, with the opportunities of exceptional reward held out if he will but make the task, tends to put upon him responsibility for wage results of which he complains. There are no simple, definite, recognized and permanent standards of work and earnings to which he can appeal. The onus of proof is upon him and the standards of judgment are set up by the employer, covered by the mantle of scientific accuracy. The unskilled worker, especially, under scientific management, loses what little chance of success as an individual he may elsewhere have in any contest with the employer, and scientific management, from the viewpoint of competitive power, tends to relegate workers to the condition of the unskilled.

It would seem, also, that scientific management tends, on the whole, to prevent the formation of groups of workers within the shop with recognized common interests, and to weaken the solidarity of those which exist. Scientific management, it is true, claims the opposite effect. The development of group feeling is fostered by the removal of irritations caused by soldiering and poor workmanship, the employment of pace makers, rewards not based on efficiency, and favoritism shown by the old line foreman. Unquestionably, irritations thus caused do interfere with group solidarity, but, as we have seen, scientific management in practice does not always remove them. The man timed on the job is in effect a pace maker and sometimes consciously such. Where the task is set high, follow-up workers complain that their predecessors scamp the work in their efforts to secure the bonus and that the inspector does not always discover the fact. This is a form of soldiering quite as irritating as that found in the old line shops. Favoritism is not always eliminated, especially where the foreman is paid a bonus on the work done under him. It is doubtless true that the methods of payment employed by scientific management result in wage rewards within the group more nearly in proportion to efficiency than under the day wage system, but, as a source of irritation in this connection, nothing could be devised more potent than the sudden jump in rates which takes place under the Taylor and Gantt systems, when the task is made. The worker who just misses the task has ample cause for irritation when his neighbor attains it perhaps through some favoring circumstance, or because he has succeeded in evading the vigilance of the inspector, or because the time studies have not been thorough enough to make proper allowance for differences in the skill required or the materials used on the same "job." Workers questioned in regard to the irritations within the group under the new and the old systems differ greatly in their replies. The writer is inclined to the opinion that, liberally and thoroughly applied, scientific management would tend to remove the irritations cited. As scientific management is practiced, no safe generalizations can be made in this connection.

But this does not by any means dispose of the main question whether or not scientific management has the effect of furthering or promoting the formation of working groups within the shop capable of effective united action. Beyond the question of irritation is that of the general effect of scientific management methods on the motives and attitudes of the workers. Here the count seems to be decidedly in favor of the trade union charges. Almost everything points to the strengthening of the individualistic motive and the weakening of group solidarity. Each worker is bent on the attainment of his individual task. He cannot combine with his fellows to determine how much that task shall be. If the individual slows down he merely lessens his wages and prejudices his standing without helping his neighbor. If he can beat the other fellow, he helps himself without affecting the other's task or pay. Assistance, unless the man is a paid instructor, is at personal cost. Special rewards, where offered, are for the individual. The chance of promotion is supposed to depend on the individual record. Rules of seniority are not recognized. Sometimes personal rivalry is stimulated by the posting of individual records or classification of the workers by name into "Excellent," "Good," "Poor," etc. Potential groups are broken up by the constant changes in methods and reclassification of workers which is the mission of time study. The whole gospel of scientific management to the worker is to the individual, telling him how, by special efficiency, he can cut loose from the mass, and rise in wages or position to a man of consequence. Only by the welfare work outside the working hours is there anything done to bring the men together. But once seated at the bench or machine, they are so many individual atoms, each dependent on his own exertions for the position he shall occupy in the heap. Decidedly, then, scientific management does not tend to the development of group solidarity within the shop.

With the power of the individual weakened, and the chances lessened for the development of groups and group solidarity, the democratic possibilities of scientific management, barring the presence of unionism, would seem to be scant. The individual is manifestly in no position to cope with the employer on a basis of equality. Collective bargaining directly by the men employed is, under the circumstances, almost unthinkable. Unless, then, scientific management has evolved and put into practice something to offset this manifest weakness of the individual and the shop group in their dealings with the employers, or holds itself ready to coöperate with unions outside, it cannot by any stretch of the imagination be called democratic. As a matter of fact, Mr. Taylor and some of his associates claim virtue for scientific management in both these respects: Scientific management is democratic in that it lessens the number of shop offenses, and the rigor of discipline, and because it produces a constant close association between the representatives of the management and the men and gives full opportunity and encouragement to every individual to make suggestions and to voice his complaints. Every avenue is open to him for this, beginning with the most minor functionary, on up to the individual who sits in the front office, which is always open to the humblest member of the shop force. All complaints are heard and if the man can prove his case, the remedy is always forthcoming. If this is not democracy in industry, where can it be found?

We have already considered the matter of shop discipline under scientific management, and have concluded that, on the whole, the claim is warranted in practice. This, however, is a minor matter in the present connection. We have also touched upon the closeness of association under scientific management between the management and the men, and concluded that while there is something in this claim, a good deal of nonsense is talked and written about it. Shops vary greatly in this respect and, so far as this investigation shows, the higher officials are often as far removed and inaccessible to the employees as in the case of the old line "autocratic" establishment. Granting, however, an open road for the worker to the employer himself and no obstruction to the making of suggestions and the voicing of complaints, let us see what this actually amounts to in practice in terms of industrial democracy. Here we must deal first with the exceptions, and then with the mass of scientific management shops. The writer has been in one or two shops where the manager so thoroughly understood the workers and the shop conditions, was so thoroughly fair-minded, and had installed such thoroughly efficient machinery for the voicing and consideration of complaints that the writer could not doubt the practical democracy of the arrangements and the outcome. In all the other shops, however, he could see no foundation for the democratic claim based on the opportunities offered for voicing complaints and the consideration given to them. In a number of shops, the managers were found to be thoroughly autocratic in attitude. Complaints were heard, but they were settled on the basis of the rules and principles laid down by the employer or the records based on them. A complaint about the task, for example, would be settled by explaining to the worker how it was set, or by showing him that it had been done or demonstrating to him that it could be done. Other employers frequently yielded to the demands of the workers, but as a matter of grace. Even where the manager was open-minded and thoroughly democratic in sentiment, it sometimes turned out that he could not understand the viewpoint of the workers or had no idea of the intricate workings of the system as it affected them, and so failed to remedy existing evils. The writer has in mind one of the best shops where the management is thoroughly fair and liberal in spirit, in which conditions existed which would not be tolerated for a moment by a body of workers with a real voice in affairs, or by the management if it knew of them, yet the front office here is always open. The fact is that where workers are individualized as in scientific management shops, their just complaints will not ordinarily be voiced even to a management in which they have confidence, much less to an autocratic employer. Anyone who knows anything of working-class psychology understands perfectly well that the individual worker does not dare to unburden himself to his superiors even under the best of circumstances. He fears to get himself marked down as a kicker or an agitator. The only way, then, by which the voice of the workers can reach the management fully and clearly is through group organization, and some sort of machinery which will allow of representation by those not directly involved. But such organization and machinery are almost wholly lacking in scientific management shops. The managers expect the workers to come to them with complaints, and they judge that the workers are satisfied by the absence of complaints. Time after time the writer was informed that the workers were entirely satisfied because no complaints had been made for months or only one a month or year. Manifestly, if what has been said of the workers' psychology is true, these are cases of complete self-deception. That this is the case the writer has proved by quizzing the men. It would seem, then, that the claim to democracy, based on the close association of the management and men and the opportunities allowed for the voicing of complaints, is not borne out by the facts, and that in the general run of scientific management shops, barring the presence of unionism and collective bargaining, the unionists are justified in the charge that the workers have no real voice in hiring and discharging, the setting of the task, the determination of the wage rates or the general conditions of employment; that this charge is true even where the employers have no special autocratic tendencies, much more so, therefore, where, as in many cases, they are thoroughly imbued with the autocratic spirit. With rare exceptions, then, democracy under scientific management cannot and does not exist apart from unionism and collective bargaining.

What, then, is the attitude of scientific management toward unions and bargaining by groups? We have already noted the Taylor claims that scientific management makes unionism and collective bargaining unnecessary as means of protection to the workers, but that it welcomes the co-operation of unionism. These claims would seem to indicate that scientific managers themselves recognize that their methods are naturally destructive of collective bargaining and unionism, but that they are in a tolerant mood toward organized labor and its policies. Whether or not scientific management is fundamentally inimical to collective bargaining and trade unionism, we shall reserve for later consideration. Here the question is one merely of the facts of the case as they at present exist. The present investigation indicates that the Taylor claims decidedly do not represent the actual situation. While scientific managers, in general, do believe that scientific management makes collective bargaining and unionism unnecessary as means of protection to the workers, this statement does not present their attitude in its entirety. There are doubtless managers who go no further than this in their thought. Some have no conception of the real meaning of collective bargaining and, therefore, no positive objections to it; some would even like to see it instituted, if this could be done without interfering with the methods which they employ and their present operation. But there is another class of scientific managers—and they constitute a large proportion—who have had experience with collective bargaining, or who think that they know its full implications, who are positively and unalterably opposed to it. They cannot see how it can possibly be made to harmonize with scientific management and, if it could be, they would still regard it as an unwarranted interference with the natural prerogatives of the employers. The fact that collective bargaining in the union sense of the term is, in general, quite foreign to scientific management shops, where its workers are not backed by outside organizations, should be decisive with respect to the general attitude of the scientific management employers in this regard.

Does the scientific manager, as a matter of fact, welcome the coöperation of unionism? Here, again, the facts should decide the contention. The fact is that, while in numbers of scientific management shops some unionists are employed, they are not generally employed as union men, and the union is rarely recognized and dealt with as such. At the outset of his investigation the attention of the writer was forcibly called to certain cases where unionism was tolerated in scientific management shops, as proof of the tolerant attitude of the managers, and the entire compatibility of scientific management and unionism. Investigation proved that inferences drawn from such cases were, in general, altogether misleading. In the most notable instances, investigation showed that the union was forced upon the employers by exceptional circumstances and that they were very much chafed by the situation. In other instances, the unions had existed, but with the result of a definite contest, and the establishment of the open shop. Where unionism was looked upon with complacency, it was usually found that the union was represented by a small group of men and performed none of the bargaining functions in the shop. In one case, particularly, where assurance had been given that perfect harmony existed between the management and the organized employees, the superintendent was quizzed in regard to the functions and activities of the union. About these things he was absolutely uninformed; why the union existed or what it did, he could not tell. He had no dealings with it as such, and the men who belonged to it were treated in no way differently from the other individual workers in the shop. The fact is that those who declared the willingness of scientific management to welcome the coöperation of unionism, in general, either knew nothing about unionism and its rules and regulations or were thinking of a different kind of unionism from that to which the American Federation of Labor stands committed, and a kind of coöperation foreign to its ideals and practices. This is indicated by Mr. Taylor's continually reiterated statement, echoed by the most democratic of his followers, that the trouble with the present day unionism is that it is organized for war, and that it limits the output. So long as it holds to these fallacies, scientific management can have no commerce with it.

To sum up: The conception of democracy held by Mr. Taylor is, for the present, at least, a Utopian dream; in their attitude toward industrial democracy as a practical matter, scientific managers are divided; a very few are truly democratic in spirit and purpose; some think themselves democratic, but analysis of their ideas and attitude shows them to be in reality adherents of a benevolent despotism in industry; more are definitely committed to the ordinary autocratic attitude of employers generally. In practice, scientific management generally tends to weaken the competitive power of the individual worker, and thwarts the formation of shop groups and weakens group solidarity; moreover, scientific management generally is lacking in the arrangements and machinery necessary for the actual voicing of the workers' ideas and complaints, and for the democratic consideration and adjustment of grievances. Collective bargaining has ordinarily no place in the determination of matters vital to the workers, and the attitude toward it is usually tolerant only when it is not understood. Finally, unionism, where it means a vigorous attempt to enforce the viewpoint and claims of the workers, is in general looked upon with abhorrence, and unions which are looked upon with complacency are not the kind which organized labor, in general, wants, while the union coöperation which is invited is altogether different from that which they stand ready to give. In practice, scientific management must, therefore, be declared autocratic; in tendency, a reversion to industrial autocracy, which forces the workers to depend on the employers' conception of fairness, and limits the democratic safeguards of the workers. Whether it is fundamentally and inevitably so will be considered later.

13. *Causes of the Shortcomings of Scientific Management in Practice*

The foregoing discussion should not prejudice the reader against all scientific managers or all attempts at scientific management. We have already called attention to the great possible benefits of the movement, and to men and shops of exceptional merit. There is, too, another side of the matter, namely, "unfounded and unproved trade union objections," which it has been found impossible to discuss within the limits of the present study. In this field, reasonable conformity to certain important ideals and claims can be shown to exist.[1] It must also be considered that scientific management is still in its infancy or early trial stages, and that immaturity and failure to attain ideals in practice are necessary accompaniments to the development of any new industrial or social movement. Doubtless, many of its shortcomings will, therefore, be cured by time.

Before this can be brought about, however, certain potent causes of present evil must be eradicated. The first of these is a persistent attempt on the part of experts and managers to apply scientific management and its methods outside their natural sphere. We speak of modern industry as though it were all of one piece. But, in fact, there is no single necessary or logical line of industrial development; no perfectly uniform set of conditions and problems in different industries or even in different shops with the same general productive output. There can, then, be no single system of organization or methods equally applicable to all industries and to all shop conditions. Adequate management as applied to any shop is not a ready-made garment to which it can be made easily to conform, but must be worked out by the slow and painful process of cut and try. It is not a surprising thing, then, to find that the most fundamental methods of scientific management as at present practiced, especially those which bear most di-

[1] See Preface.

rectly on labor and labor conditions, have a limited sphere of applicability. As indicated in the discussion of time study and modes of payment, they can be applied with reasonable accuracy and justice to the workers only where production is relatively stable, and only in the more simple and repetitive lines of work. Much of the evil of which workers complain in scientific management shops is due to attempts to apply these methods indiscriminately and arbitrarily to all sorts of industries, under all sorts of conditions and to all kinds of work. For this, Mr. Taylor is to be held largely responsible. His experience primarily was that of a machinist. He worked out a system of control for application to the machine shop where the dangers of overspeeding and overfatigue are not as great as in some other industries and the human factor requires relatively less consideration in the setting of the task. But, being an enthusiast, he proceeded at once to broad generalizations, based on his machine shop experience. He believed that he had discovered industrial laws and methods of universal applicability. And being also an idealist, he failed to distinguish between what might be and what is. His personality and his claims fired a relatively large following who, without much understanding of the subtler labor problems involved, proceeded to attempt the universal application of his methods, and these have been followed by a less intelligent and less worthy set of imitators.

A second chief source of danger and evil to labor in the application of scientific management is that it offers its wares in the open market, but it has developed no means by which it can control the use of these by the purchaser. In large part, the practical departure of scientific management from its ideals is the result of special managerial or proprietorial aims, and impatience of delay in their fulfillment. While there are exceptions to the rule, it is generally true that the management in calling in the systematizer has its own very special and immediate ends and that the systematizer does not have a free hand in carrying out his plans and purposes, but is subject to the will, judgment and whim of the employing or proprietary personnel. In many cases, the employing management is not a unit in its desires and demands. The systematizer, therefore, more often than not, meets with opposition within the management, and must subordinate his design and modify his plans and methods to meet the wishes of an opposing element there. But even where the management is a unit in desire, its purposes are often not in immediate harmony with those of the systematizer. In many cases, the expert is called in because the establishment is in financial or industrial straits, and the chief concern of the management is quick increase of production and profits. It must meet its competitors here and now, and cannot afford to expend more than is necessary to do this, or to forego immediate returns while the foundations are being laid for a larger but later success, and with careful regard to immediate justice and the long-time welfare of its working force. In such cases, which are deplorably many, the systematizer must usually forego, to a great extent, the careful preliminary improvement and standardization of machinery and processes, the adequate organization of the accounting and sales departments, and the careful development of a functional staff, things which the best authorities agree should precede the definite handling of the labor problem, and proceed immediately to task and rate setting, with results varying greatly from his mature designs and entailing almost inevitably unintended positive errors and injustices where the laborers are concerned, and absence or immature application of the means and methods designed by him for their protection and welfare. The outcome is frequently conflict between the systematizer and the management, resulting in the abandonment of the scheme only partially worked out or the retirement of the expert, leaving the management to apply crudely the methods partially installed, sometimes to the detriment of the workers and their interests.

It is true that the situation thus outlined is not of universal application. In some cases, the concern to be systematized is in a strong industrial and financial condition, and the management is fully converted to the plan of the systematizer, and willing to wait for long-time results. But more often than not, opposition exists somewhere within the management group, and, in general, the extent and direction of the work of the systematizer are limited by the dominant proprietorial will. The writer has frequently given ear to bitter complaints from members of the small group of experts who represent the highest ideals and intelligence of the movement, in regard to the managerial opposition which they have encountered, and frequent apologies have been offered for the conditions and results of their work, accompanied by the statement that they could go no further than the management would allow, or that things had been done by the management against their judgment and for which they could not stand.

But it is not always the willful opposition of the management or the special financial straits of the concern that prevent the practical realization of the best ideals of the expert in the process of installation. After all, scientific management is closely interlocked with the mechanism of production for profit and the law of economy rules.[1] Many things, which would be desirable from the ideal viewpoint and which are a practical necessity if the interests of the workers are to be fully protected, are not always or usually economical. This is especially true of time study, task setting and rate making. Here it frequently happens that relatively simple and crude tests serve to establish conditions and lay down rules that will increase production and profits without giving rise to glaring injustices or causing open labor protest, and even, it may be, with immediate gain to most of the workers over their previous wages and conditions of employment, while the more thorough tests which would be required to secure relative justice to all the workers and to insure long-time benefits to them are uneconomical, costing more than they would return to the management. Under such circumstances, even the most thoroughgoing scientific management experts halt the work of installation far short of conditions which would make good the labor claims of scientific management, and content themselves with "making allowances" which "in their judgment" are sufficient to offset any evils and injustices which might arise out of the crudity of their tests and studies.

---

[1] Under the competitive system, with all of its possible benefits, it is undeniable that the interests of society or of the laboring group may be sacrificed for individual gain.

The arbitrary will of the employer, then, and the law of economy are two potent special forces which contribute to the existing diversity, incompleteness and crudity of scientific management as it is practiced, even where the systematizer is possessed of the highest intelligence and imbued with the best motives of his group.

But to explain the situation as it exists at present, two other important factors must be taken into consideration. The first of these is the existence and practice of self-styled scientific management systematizers and time study experts who lack in most respects the ideals and the training essential to fit them for the work which they claim to be able to do. Scientific management as a movement is cursed with fakirs. The great rewards which a few leaders in the movement have secured for their services have brought into the field a crowd of industrial patent medicine men. The way is open to all. No standards or requirements, private or public, have been developed by the application of which the goats can be separated from the sheep. Employers have thus far proved credulous. Almost anyone can show the average manufacturing concern where it can make some improvements in its methods. So the scientific management shingles have gone up all over the country, the fakirs have gone into the shops, and in the name of scientific management have reaped temporary gains to the detriment of the real article, the employers and the workers.

Just who these fake scientific management experts and time study men are it is impossible to tell, since no recognized standards of judgment exist. Accusations indeed are over-plentiful, but repetition of them would not be warranted here. What proportion of the numerous failures of so-called scientific management, of the positive errors and evils of time study, task setting and rate making, found in shops under this name, are due to the work of these fakirs, is another matter on which no judgment can be passed, though scientific managers have variously estimated the fakirs as four out of five, or nine out of ten. The certainty is that this element exists; that its representatives, apparently, cannot be clearly distinguished and set off under existing circumstances from the more legitimate scientific management practitioners; that the legitimate scientific management group seems powerless to eliminate or control it; and that it exposes employers and workers to the losses and injustices of crude and inaccurate industrial tinkering —all in the name of scientific management and under the protection of its promises and its claims.

Fake scientific management experts, however, are not alone responsible for the lack of training and intelligence which contribute to the diversity and immaturity of scientific management in practice and its failure to make good the labor claims of its most distinguished leaders. The fact is that, on the whole and barring some notable exceptions, the sponsors and adherents of scientific management—experts and employers alike—are profoundly ignorant of very much that concerns the broader humanitarian and social problems which it creates and involves, especially as these touch the character and welfare of labor. This statement is made wholly without intent to impugn the general intelligence or motives of the members of the scientific management group. While expressing this as his mature conviction, the writer wishes to pay a high tribute to the character and intellectual capacity of many of the scientific management experts and employers with whom he has become acquainted during the course of this investigation. Many of these men have exhibited a straightforward honesty and sincerity of purpose that cannot be questioned; they have shown an earnest desire to get at the truth underlying this controversy, and to rectify all errors and evils that could be demonstrated to them in connection with their work or shops; many of them are serious students of economic and social questions, who bring to their study earnestness and intelligence of a high order, and a sincere desire to safeguard and improve the welfare of labor. But, viewing the group as a whole, the fact remains as stated above. This is partly due to the newness of their approach to the questions involved, and a consequent unfamiliarity with the many facts and problems that have been brought into prominence recently by the students of the social sciences, and especially with the newer viewpoints and standards of judgment that have thus been developed. The prominent members of the scientific management group—engineers and employers for the most part—seem to be developing their economic and social theories, in fact, almost wholly on the basis of their own experience and of the simple, fundamental and general assumptions which economists and social scientists generally have tried out and abandoned. Their reasonings and conclusions in regard to such matters, therefore, have many of the marks of the naïveté of early scientific beginnings. Problems which are to the modern social scientists complex and enormously difficult—at present unsolvable—appear to them simple, and they rush to solutions, conclusions and claims, deduced from narrow, absolutistic assumptions, which have no warrant in fact. This awakening to economic and social problems by the engineers and scientific management employers is, in itself, a most hopeful sign. They are close to the practical problems of industry. Their efforts seem bound in the end to correct economic errors and to enrich economic thought. But, in the present, the tendency is to rush in boldly with crude statements of "laws" and "solutions" and claims that could be made good only on the basis of much that social science at its best has as yet not attained. And these solutions and claims are rendered the more naïve and inadequate by the fact that these engineers and employers have not approached, as a rule, and, by the very nature of their occupation and experiences, cannot approach any real comprehension of the peculiar conditions and relations that create the aims, attitudes, problems, standards, and ideals of the workers, whose needs and welfare and sense of justice they easily assume to interpret and to be able to satisfy.

This naïve ignorance of social science and of the social effects of scientific management, and the cocksureness which accompanies it are perhaps the most potent cause of the diversity and immaturity of scientific management where it touches the welfare of the labor group. It is because of this ignorance and unwarranted assurance that there is a strong tendency on the part of scientific management experts to look upon the labor end of their work as the least difficult and requiring the least careful consideration. To their minds, the delicate and difficult part of the task of installation is the solution of the material, mechanical and organic problems involved. They tend to look upon the labor end of their work as a simple technical matter of so setting tasks and making rates, that the workers will give the fullest productive coöperation. They tend naïvely to assume that when the productivity of the concern is increased and the laborers are induced to do their full part toward this end, the labor problem in connection with scientific management is satisfactorily solved. In short, in the majority of cases, the labor problem appears to be looked at as one aspect of the general problem of production in the shop, and it is trustfully assumed that, if it is solved with reference to this problem, it must also be solved with due regard to labor's well-being and its just demands. This seems to have been the characteristic attitude of scientific management from the beginning. Labor was looked upon simply as one of the factors entering into production, like machinery, tools, stores and other elements of equipment. The problem was simply how to secure an efficient coördination and functioning of these elements. It was only after the opposition of labor had been expressed that scientific management began to be conscious of any other aspect of the labor matter. And, with some notable exceptions, scientific management experts and employers still look upon the labor matter almost solely as an aspect of the general production problem, and have little positive interest or concern in regard to it otherwise.

The crude and variable handling of the labor end of the scientific management installation and operation is a natural consequence. It is largely for this reason that scientific management experts who have had actual experience in only one line of industry boldly undertake the systematization of shops in industries with which they are practically unfamiliar. The affair in their mind is simply productive efficiency through the application of certain mechanical and organic principles. It is for this reason that time study experts who perhaps have had no first-hand industrial experience feel themselves capable of setting tasks for any shop or industry, to apply to any laborer or group of laborers. It is for this reason that the mass of the time study men found in the shops, who actually set tasks and make rates, are poorly paid and are not men of an intellectual and moral quality and breadth of training and education calculated to inspire the confidence of the investigator and his official experts. It is largely for this reason also that the methods of time study and task setting vary greatly from shop to shop even in the same industry; that tasks are often set by guess or on an inadequate basis of study; that many different variations of the modes of payment advocated by scientific management are found, and that in the same shop and often in the same department, different modes of task setting and different modes of payment coexist; that tasks are often not set on complicated work and on new work; that, consequently, the most efficient workers sometimes must be content with the day rate while beside them less efficient men earn the day rate and a bonus in addition; that the selection of workers varies little in method from that employed in ordinary shops; that little actual attention is paid to studies of fatigue; and that the ability of the worker to make the task is usually considered evidence of sufficient training and of adaptation of the task to the worker. All of which things characterize scientific management in practice though they may not be universal under it.

It is probable that scientific managers will object to these statements, pleading that these are mainly variations and conditions due to the time element, or to the necessity imposed by the law of costs. They will say, for example, when a new and unusual job comes in that neither time nor economy will allow of careful time studies; that, if careful studies were made of all the variations of a complicated task, the expense of such studies would wipe out the profit; that, in general, they are proceeding toward the full realization of the ideal of scientific management as fast as economy will allow. But such pleas would only serve to confirm the main contention that scientific managers and scientific management employers generally are necessarily ruled, like all members of the employing group, by the forces of cost and profits, that to them the labor problem is primarily an aspect of the greater problem of production, and that in the end the needs and welfare of labor must be subordinated to these things. Beneath all other causes of shortcomings of scientific management, therefore, in its relation to labor, there seems to be the practical fact of an opposition of interests between the profit-taking and the labor groups, which makes extremely doubtful the possibility that its shortcomings from the viewpoint of labor are capable of elimination.

C. Scientific Management and Labor Welfare

Thus far, we have emphasized the effects on labor of scientific management as it is actually practiced. We come now to more fundamental matters—inherent characteristics of scientific management and its more ultimate effects upon labor and labor welfare, assuming it to be fully and properly applied.

Scientific management, at its best, furthers the modern tendency toward the specialization of the workers. Its most essential features—functional foremanship, time study, task setting and efficiency payment—all have this inherent effect. Functional foremanship means that the worker is to have taken from him much of the former work which he performed in connection with the particular job. An example of this is afforded by the work of the machine operator, whose machine is not of the largely automatic or automatic type. Under the ordinary form of management found in industries, the machine operator is something more than a mere feeder of material into the machine, for he performs manual and mental labor as the result of his craft knowledge and skill, which is as essential to complete the product as is the work done by the machine. In addition to being a machine operator, he cares for the machine, corrects and repairs minor accidents, makes necessary adjustments, attends to the belting and grinds his own tools. He exercises also, within reasonable limits which call for his initiative and dependence upon his craft knowledge, individual judgment in the laying out and setting up of a job, and in determining the method and the feed and speed to be employed in running the material through. Under scientific management, on the other hand, in its fullest development, this same workman becomes a machine tender. All the extra work is done for him by a series of functional foremen or specialist workmen. The belting connected with the machine is cared for by a special functionary—the belt man; the tools which he uses are brought to him already ground by a specialist who does nothing else; his materials are always at hand, delivered by the move man, who also takes away the product. The laying out and setting up of the work, the feed and speed to be used in doing it, and the mode of handling the material and putting it through the machine are determined by special functionaries and embodied in written instructions, except where the functional foreman is actually present to perform or assist in the initial operation or where the work is so thoroughly subdivided and repetitive that actual instructions are not deemed necessary, and, though the worker may depart in some instances from the instructions given, he does so at the peril of the bonus, premium or higher differential piece rate. Under the system as fully developed, he is intended to be and is, in fact, a machine feeder and a machine feeder only, with the possibility of auxiliary operations clearly cut off and with means applied to discourage experimentation. And what applies to the machine feeder applies with more or less thoroughness to machine and hand operatives generally. Functional foremanship projects the managerial activity down into every phase of the shop work. As Mr. Taylor says, it effects a more equal division of the work between the management and the men by taking from the latter many of the activities which they were formerly obliged to perform.

But it is not merely in stripping from the job its auxiliary operations that scientific management tends to specialize the work and the workman. Time study, the chief cornerstone of all systems of scientific management, tends inherently to the narrowing of the job or task itself. The chief function of time study is the analysis of work; the reduction of operations to their elementary motions and units, and the recombination of these elements into operations more quickly and easily performed. Doubtless, time study thus may sometimes result in the discovery that new elements or operations may be added to former jobs with a distinct contribution to efficiency and economy, or that former operations may be effectively combined. But as the final object of time study, so far as it directly touches the workers, is to make possible the setting of tasks so simple and uniform and so free from possible causes of interruption and variation, that definite and invariable time limits can be placed upon them, and that the worker may be unimpeded in his efficient performance of them by the necessity for questioning and deliberation, the preponderating tendency of time study is to split up the work into smaller and simpler operations and tasks. This tendency is not always apparent in scientific management shops because sometimes, especially where these represent an old-established machine industry, the specialization of work has already been carried to the extreme, compatible with the machinery in use. But time study furthers the invention of new machinery of a more automatic type and of machinery for the performance of former hand operations. An interesting side light was thrown upon this whole matter in one shop visited where time study for standardization and improvement had been especially emphasized. Here former hand work had been progressively converted into machine work, and the cycle of many operations in the particular job had become so short that the management had been unable to catch them accurately by means of the stop watch, and so despaired of being able to set tasks by means of elementary time study. Decidedly, then, time study tends to further the modern tendency toward specialization of the job and the task.

With functional foremanship lopping off from the job auxiliary operations, and time study tending to a narrowing of the task itself, task setting and efficiency methods of payment come into play as forces tending to confine the worker to a single task or a narrow range of operations. The worker is put upon the special task for which he seems best adapted, and he is stimulated by the methods of payment employed to make himself as proficient as possible at it. When he succeeds in this, to shift him to another task ordinarily involves an immediate and distinct loss to the employer, and the worker himself naturally resents being shifted to a new task involving, thus, an immediate loss in his earnings. Here worker and employer are at one in their immediate interest to have the job so simple that the operation can be quickly learned and the task made, and that shifting of tasks be eliminated as far as possible. The employer, besides, has another motive for this in that the shifting of the workers multiplies the records and renders more complex the system of wage accounting. It is true that the scientific management employer, like any other, must have a certain number of workers in the shop who are capable of performing a plurality of tasks. This is necessary to meet the special exigencies which arise from absences of workers, special rush orders, the maintenance of the organization and the continuation of operations during slack periods. But the tendency is to have as few all-round workers as is necessary to meet these emergencies. The methods of scientific management operate most effectively when they break up and narrow the work of the individual, and the ends of scientific management are best served when the rank and file of the workers are specialists.

This inherent tendency to specialization is buttressed, broadened in its scope and perpetuated by the progressive gathering up and systematizing in the hands of the employers of all the traditional craft knowledge in the possession of the workers. With this information in hand and functional foremanship to direct its use, scientific management claims to have no need of craftsmen, in the old sense of the term, and, therefore, no need for an apprenticeship system except for the training of functional foremen. It, therefore, tends to neglect apprenticeship except for the training of the few. And as this systematized body of knowledge in the hands of the employer grows, it is enabled to broaden the scope of its operation, to attack and specialize new operations, new crafts and new industries, so that the tendency is to reduce more and more work to simple, specialized operations and more and more workers to the position of narrow specialists. Nor does scientific management afford anything in itself to check or offset this specializing tendency. The instruction and training offered is for specialist workmen. Selection and adaptation are specializing in their tendencies. Promotion is for the relatively few. The whole system, in its conception and operation, is pointed toward a universally specialized industrial régime.

But scientific management is not only inherently specializing, it also tends to break down existing standards and uniformities set up by the workmen, and to prevent the establishment of stable conditions of work and pay. Time study means constant and endless change in the methods of operation. No sooner is a new and better method discovered and established and the conditions of work and pay adapted to it than an improvement is discovered involving perhaps new machinery, new tools and materials, a new way of doing things, and a consequent alteration of the essential conditions of work and pay, and perhaps a reclassification of the workers. Change and more change is the special purpose and mission of this special instrument and central feature of scientific management. That scientific management shops do reach a position of stable equilibrium does not militate against this contention. They remain relatively unchanged because of a failure to avail themselves fully of the possibilities which time study affords. The tendency to flux in every minutest feature and method of doing work and dealing with workmen is always there.

Ample evidence to support this analysis was afforded by the investigation. Where the system was found relatively completely applied, the mass of the workers were engaged in specialized tasks; there was little variation in the operations except in emergencies; apprenticeship for the many was abandoned or was looked upon as an investessential. It has been proved by experience that unskilled workers generally find it most difficult to maintain effective and continuous organization for dealing with complicated industrial situations. But effective collective bargaining, as we have it now, cannot exist without effective organization. Moreover, we have already seen how scientific management, apart from the matter of skill, tends to prevent the formation and weakens the solidarity of groups within the shop.[1] But beyond all this, time study strikes at the heart and core of the principles and conditions which make unionism effective in its present dominant form and collective bargaining possible with respect to certain most essential matters. In so far as the unionists are right in their declaration that opposition of interests exists between employer and workmen, present day unionism and collective bargaining cannot exist apart from uniformity of conditions and stable classification of the workmen. When the employer can constantly initiate new methods and conditions and reclassify the work and the workmen, he can evade all efforts of the union to establish and maintain definite and continuous standards of work and pay. But time study, as we have seen, is in definite opposition to uniformity and stable classification. It enables the employer constantly to lop off portions of the work from a certain class and thus constantly to create new classifications of workers, with new conditions of work and pay. Add to all this the advantage gained by the employers in the progressive gathering up and systematization of craft knowledge for their own uses, and the destruction of apprenticeship which cuts the workers off from the perpetuation among them of craftsmanship, and the destructive tendencies of scientific management, as far as present-day unionism and collective bargaining are concerned, seem inevitable.[1] The outlook from the dominant union point of view cannot be better described than by quoting a recent editorial which appeared in the *International Molders' Journal.*

---

[1] A distinction must here be drawn between group solidarity, based upon craft relationships, and class solidarity based upon general industrial conditions and relationships. While machine industry has tended, and doubtless scientific management tends, to prevent the formation, and to break down the solidarity of craft groups, machine industry has been the strongest force in the creation of class consciousness, and industrial as well as class solidarity among the workers. We should expect scientific management to have a similar effect.

MODERN INDUSTRY AND CRAFT SKILL

The one great asset of the wage worker has been his craftsmanship. We think of craftsmanship ordinarily as the ability to manipulate skillfully the tools and materials of a craft or trade. But true craftsmanship is much more than this. The really essential element in it is not manual skill and dexterity but something stored up in the mind of the worker. This something is partly the intimate knowledge of the character and uses of the tools, materials and processes of the craft which tradition and experience have given the worker. But beyond this and above this, it is the knowledge which enables him to understand and overcome the constantly arising difficulties that grow out of variations not only in the tools and materials, but in the conditions under which the work must be done.

In the past, for the most part, the skillful manipulation of the tools and materials of a craft and this craftsmanship of the brain have been bound up together in the person of the worker and have been his possession. And it is this unique possession of craft knowledge and craft skill on the part of a body of wage workers, that is, their possession of these things and the employer's ignorance of them, that has enabled the workers to organize and force better terms from the employers. On this unique possession has depended more than on any other one factor the strength of trade unionism and the ability of unions to improve the conditions of their members.

---

[1] This does not, of course, imply the destruction of all possible forms of unionism. As we have intimated earlier, scientific management, as well as machine industry, while destructive of craft solidarity, seems favorable to the development of class solidarity among the workers. Though it tends, therefore, to destroy unionism based on crafts, and to render ineffective methods of unionism (like those of collective bargaining), which, as at present conceived and employed, depend for their success on the maintenance of crafts, stable classification of workmen, and uniform conditions, it does not imply the general destruction of labor solidarity or organization. The destructive tendencies are on the present dominant form and methods of unionism.

This being true, it is evident that the greatest blow that could be delivered against unionism and the organized workers would be the separation of craft knowledge from craft skill. For if the skilled use of tools could be secured from workmen, apart from the craft knowledge which only years of experience can build up, the production of "skilled workmen" from unskilled hands would be a matter, in almost any craft, of but a few days or weeks; any craft would be thrown open to the competition of an almost unlimited labor supply; the craftsmen in it would be practically at the mercy of the employer.

Of late, this separation of craft knowledge and craft skill has actually taken place in an ever-widening area and with an ever-increasing acceleration. Its process is shown in the two main forms which it has been taking. The first of these is the introduction of machinery and the standardization of tools, materials, product and process, which make production possible on a large scale, and the specialization of the workmen. Each workman under such circumstances needs and can exercise only a little craft knowledge and a little craft skill. But he is still a craftsman, though only a narrow one and subject to much competition from below. The second form, more insidious and more dangerous than the first, but to the significance of which most of us have not yet become aroused, is the gathering up of all this scattered craft knowledge, systematizing it and concentrating it in the hands of the employer and then doling it out again only in the form of minute instructions, giving to each worker only the knowledge needed for the mechanical performance of a particular relatively minute task. This process, it is evident, separates skill and knowledge even in their narrow relationship. When it is completed, the worker is no longer a craftsman in any sense, but is an animated tool of the management. He has no need of special craft knowledge or craft skill, or any power to acquire them if he had, and any man who walks the street is a competitor for his job.

> There is no body of skilled workmen today safe from the one or the other of these forces tending to deprive them of their unique craft knowledge and skill. Only what may be termed frontier trades are dependent now on the all-round craftsman. These trades are likely at any time to be standardized and systematized and to fall under the influence of this double process of specialization. The problem thus raised is the greatest one which organized labor faces. For if we do not wish to see the American workmen reduced to a great semi-skilled and perhaps little organized mass, a new mode of protection must be found for the working conditions and standards of living which unions have secured, and some means must be discovered of giving back to the worker what he is fast losing in the narrowing of the skill and the theft of his craft knowledge. It is another problem which the organized workmen must solve for themselves and for society.

Under these circumstances, the progressive degeneration of craftsmanship and the progressive degradation of skilled craftsmen under scientific management would seem inevitable, unless some means can be found for their preservation and development outside the shop.

Granting the correctness of this interpretation, the more ultimate effects of scientific management, unsupplemented, should it become universal, upon wages, unemployment, and industrial peace, are matters of pure speculation. During the period of transition, however, there can be little doubt of the results. The tendency will be toward a realignment of wage rates. The craftsmen, the highly trained workers, cannot hope to maintain their wage advantage over the semi-skilled and less skilled workers. There will be a leveling tendency. Whether this leveling will be up or down, it is impossible to say. At present, the writer believes that scientific management is making the relatively unskilled more efficient than ever before, and that they are in general receiving under it greater earnings than ever before. It is evident, however, that the native efficiency of the working class must suffer from the neglect of apprenticeship, if no other means of industrial education is forthcoming. Scientific managers, themselves, have complained bitterly of the poor and lawless material from which they must recruit their workers, compared with the efficient and self-respecting craftsmen who applied for employment twenty years ago. Moreover, it must not be overlooked that the whole scheme of scientific management, especially the gathering up and systematization of the knowledge formerly the possession of the workmen, tends enormously to add to the strength of capitalism. This fact, together with the greater ease of replacement, shown above, must make the security and continuity of employment inherently more uncertain. It may not be such in fact, but, if not, the result will be by grace of the employer.

If generally increased efficiency is the result of scientific management, unemployment would, in the end, seem to become less of a menace. But during the period of transition, we should expect its increase. Not only must the old craftsmen suffer as the result of the destruction of their crafts, but, until scientific management finds itself able to control markets, its increased efficiency must result in gluts in special lines with resulting unemployment in particular trades and occupations. The writer was informed by a leading scientific management expert that one shop of six in a certain industry systematized by him could turn out all the product that the market would carry. The result to the workers, if the statement be true, needs no explanation. Scientific management would seem to offer ultimately possibilities of better market control or better adaptation to market conditions, but the experience of the past year of depression indicates that at present no such possibilities generally exist.

Finally, until unionism as it predominantly exists has been done away with or has undergone essential modification, scientific management cannot be said to make for the avoidance of strikes and the establishment of industrial peace. Mr. Taylor's statement that no strike has ever occurred under scientific management means simply that, if a strike occurs, scientific management, in Mr. Taylor's conception of it, does not exist. The writer has discovered several well-authenticated cases of strikes which have occurred in scientific management shops. He is inclined to believe that they are less frequent in this class of shops than elsewhere in similar establishments, owing largely to the fact that organized workmen are on the whole little employed. In its extension, however, it is certain that scientific management is a constant menace to industrial peace. So long as present-day unionism exists, and unionists continue to believe, as they seem warranted in doing, that scientific management means the destruction of their organizations or their present rules and regulations, unionism will doubtless continue to oppose it energetically whenever and wherever opportunity affords.

It has been said with much truth that scientific management is like the progressive invention of machinery in its effect upon workers and social conditions and welfare generally—that it gives a new impulse to the industrial revolution which characterized the latter part of the eighteenth and the nineteenth centuries and strengthens its general effects and tendencies. A chief characteristic of this revolution has been the breakdown of craftsmanship, the destruction of crafts, and the carrying of the modern industrial world forward toward an era of specialized workmanship and generally semi-skilled or less skilled workmen. Scientific management seems to be another force urging us forward toward this era and practically adapted to function in an age of specialized and unskilled workmanship. Here we glimpse the great problem with which its spread and development confront modern society. No solution or series of solutions offered for this problem can be considered at all adequate which does not meet the needs of such a situation. It is a long-time problem which requires a long-time solution.

What is really needed, under the circumstances, is not so much repression and direct control as social supplementa tion and increased knowledge. The main demands are fo a frank recognition of the trend of events and for som method of putting back into the worker's life the conten which he is losing as the result of increased specializatio and the abandonment of the old apprenticeship system. Th development of such a method will, of course, take time In the meanwhile, we need more thorough study and gen eral publicity concerning the true character, policies, and methods of scientific management, its possibilities, responsibilities and limitations; concerning the real character, intelligence and spirit of those engaged in its application, the qualities and qualifications required by the best social standards for the exercise of this power and responsibility, and the progressive education of scientific management experts and employers, labor and the public, to the needs and requirements of the situation.

SCIENTIFIC MANAGEMENT AND LABOR

PART I

VIEWPOINT AND METHOD

1. THE GENESIS AND NATURE OF THE INVESTIGATION

The present study was the result primarily of hearings on scientific management held by the United States Commission on Industrial Relations, in April, 1914. At these hearings, it developed that the representatives of organized labor stand in almost unqualified opposition to what they regard as scientific management, and that the claims and counterclaims put forward by scientific management and labor leaders are far-reaching and apparently in irreconcilable conflict. It was primarily to test the validity of these opposing claims, and to determine what, if anything, can be done to harmonize the relations of scientific management and labor, and to protect and promote the welfare of all concerned, that the investigation was undertaken.

The general scope of the study was naturally determined by the character of the opposing groups. "Organized labor," declared the committee especially appointed to represent the attitude of the American Federation of Labor in this connection, "understands by the term 'scientific management' certain well-defined 'efficiency systems' which have been recently devised by individuals and small groups under the leadership or in imitation of men like Frederick W. Taylor, H. L. Gantt, and Harrington Emerson, by whom this term has been preëmpted. . . . Its objections are directed solely against systems of the so-called 'scientific management' cult." In view of this statement and the limited time for the work in hand, it seemed best to confine the study mainly to the systems of scientific management named above, and their variations, and, in order that it should be fair in all respects to these systems and their representatives, Mr. Taylor, Mr. Gantt, and Mr. Emerson were requested to designate the shops to be investigated. This was done, and with a few special exceptions, the study was limited to shops so named.

In preparation for the work of actual investigation, a study was made of scientific management as presented by its leading advocates, and the controversial literature was carefully examined in order to determine the exact character of its labor claims and the charges made by organized labor against it. The books, papers, and pamphlets, the hearings and government reports bearing on the subject were read, and representatives on both sides of the controversy consulted. On the basis of this careful study, two preliminary statements were prepared, presenting, respectively, the "Labor Claims of the Scientific Managers" and the "Trade Union Objections to Scientific Management." The first of these statements was submitted successively to Mr. Taylor, Mr. Gantt, and Mr. Emerson, for revision and approval; the second was modified and approved by a committee appointed by the Executive Council of the American Federation of Labor, and by the chief officers of that organization. From these official documents, the writer was able to determine with assurance the vital points at issue[1] between the contesting parties, and, in view of these, to draw up a questionnaire covering the information needed to determine the truth in regard to them.[2]

In the meantime, an extended search was made for experts acceptable to each side to accompany the investigator in the examination of shops, and to insure the fairness and thoroughness of the study. He was signally fortunate in securing thus the appointment and services of Mr. Robert G. Valentine, Industrial Counselor, of Boston, to represent employing management, and Mr. John P. Frey, of Cincinnati, Editor of the *International Molders' Journal*, to represent the interests of labor.

---

[1] See Appendices VI and VII.

[2] See Appendix VIII.

The investigation of shops was begun early in January, 1915, and with some interruptions, continued to the last of April, 1915. Thirty-five shops and systematizing concerns were examined, and interviews were had with many prominent scientific management leaders, experts, employers and labor leaders. Following is a partial list of shops and concerns visited:

I. SCIENTIFIC MANAGEMENT PLANTS—(In Whole or in Part)
  - Tabor Manufacturing Co., Philadelphia
  - The Link Belt Co., Philadelphia
  - The Standard Roller Bearing Co., Philadelphia
  - Smith and Furbush Machine Co., Philadelphia
  - Ferracute Machine Co., Bridgeton, New Jersey
  - Brighton Mills, Passaic, New Jersey
  - Acme Wire Co., New Haven, Connecticut
  - Sayles Bleacheries, Saylesville, Rhode Island
  - The Plimpton Press, Norwood, Massachusetts
  - The New England Butt Co., Providence, Rhode Island
  - The Watertown Arsenal, Watertown, Massachusetts
  - The Remington Typewriter Co., Ilion, New York
  - The H. H. Franklin Manufacturing Co., Syracuse, N. Y.
  - The Diamond Chain and Manufacturing Co., Indianapolis, Ind.
  - The Aluminum Castings Co., Detroit, Michigan
  - Joseph and Feiss, Clothcraft Shops, Cleveland, Ohio
  - The H. Black Co., Cleveland, Ohio
  - The Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.
  - Jones and Laughlin Co., Pittsburgh, Pa.
  - King Sewing Machine Co., Buffalo, New York
  - The Republic Metalware Co., Buffalo, New York

work out in the shops designated by them, and to include whatever policies and methods investigation has proved to be characteristic of such shops, bearing in mind that the movement at present is not fixed and final, but is in its early stages of development.

In making this study, the effort has been to avoid personal bias, and to view all matters purely from the standpoint of fact and cause. The purpose of the investigation has been to lay foundations for the judgment of scientific management, not relative to an absolute ideal, but relative to the alternative which would exist without it. There is no desire to uphold or to condemn either party to the controversy, least of all to foment contest. The prime objects are to lay bare the facts of the actual situation and to dispel misunderstandings, as a starting point and basis for reasonable control and constructive effort. Any criticisms of scientific management which follow must be understood in this light. Nor should they be regarded as necessarily applicable to all scientific management shops. The writer has become acquainted with scientific managers for whom he has the highest respect and admiration—men who are capable of putting human above pecuniary considerations, who have the interest of their workmen truly at heart, so far as they see it, and who are glad to do all in their power to remedy evil effects that can be shown to exist. Unfortunately, these men do not represent the only type concerned with the installation and operation of the new systems, and in the interest of truth and justice, it has been necessary to weigh the evil with the good.

Finally, the writer wishes to acknowledge the invaluable assistance of the official management and labor experts. Their presence and counsel have brought to light many significant facts that otherwise might have been overlooked, and their judgment has been of prime importance in the weighing of the evidence secured. Without their hearty coöperation, the investigation would have proved relatively unprofitable, if not impossible.

2. THE CLAIMS OF SCIENTIFIC MANAGEMENT RELATIVE TO LABOR

Scientific management in theory is not a single, consistent body of thought. While there is doubtless a fundamental unity in the movement, various leaders and would-be leaders have arisen, each with his own peculiar doctrines or his own particular emphasis upon special aspects of the system. Vital contradictions and important additions and omissions have thus appeared which tend to separate the scientific management group into schools, differing considerably in general viewpoint. The most important of these so-called schools are those, respectively, of the late Mr. F. W. Taylor, Mr. H. L. Gantt, and Mr. Harrington Emerson.[1]

It is impossible to state the labor claims of the Taylor, Gantt and Emerson schools as one consistent whole, but it would be misleading to present them as three independent and equally important bodies of thought. Mr. Taylor is usually credited with being the founder of scientific management and has been almost universally recognized as its leading exponent. His system is more complete, is worked out with greater consistency and concrete detail, and has been applied with greater fidelity than those of his rivals. His adherents constitute also the strongest and most loyal body of scientific managers, and it is to the Taylor system that organized labor has most generally and most strenuously objected. In fact, the Taylor system has been and still is regarded in most quarters as scientific management par excellence and practically identified with the more inclusive term.

---

[1] These schools are not altogether distinct either in theory or practice. There is considerable overlapping of thought by the leaders and among the assumed followers; both within the schools and without, there is much diversity and departure from the model, due to a distinct element of charlatanism.

Under these circumstances, the writer has felt justified in making Mr. Taylor's statements of the nature of scientific management and its relations to labor the standard claims of scientific management.[1] In presenting the labor claims of scientific management, therefore, and in judging them with reference to the facts, the Taylor system has been taken as the positive basis of exposition and comparison, the Gantt and Emerson claims being presented and dealt with only as they differ from or modify Mr. Taylor's statements.

The labor claims of scientific management, according to Mr. Taylor, constitute a body of nearly forty leading points with many subordinate affirmations. Their general spirit and character may be indicated by the following much abbreviated statements:[2]

1. The General Definition of Scientific Management.—Scientific management is a system devised by industrial engineers for the purpose of subserving the common interests of employers, workmen, and society at large, through the elimination of avoidable wastes, the general improvement of the processes and methods of production, and the just and scientific distribution of the product.

2. Fundamental Principles of Scientific Management.—Scientific management rests on the fundamental economic principles that harmony of interests exists between employers and workers, and that high general wages and better general conditions of employment can be secured through low labor cost.

3. The Relation of Scientific Management to Fact and Law.—Scientific management attempts to substitute in the relations between employers and workers the government of fact and law for the rule of force and opinion. It substitutes exact knowledge for guesswork and seeks to establish a code of natural laws equally binding upon employers and workmen.

---

[1] The specific differences which exist between the claims of Mr. Taylor, Mr. Gantt and Mr. Emerson are shown in Appendices III and IV.

[2] For the full statement of the Taylor claims, see Appendix II.

4. *The Scientific and Democratic Character of Scientific Management.*—Scientific management is thus at once scientific and democratic.

In time and motion study it has discovered and developed an accurate scientific method by which the great mass of laws governing the easiest and most productive movements of men are registered. These laws constitute a great code which, for the first time in industry, completely controls the acts of the management as well as those of the workmen.

It pays men rather than positions and through its methods of payment makes possible the rewarding of each workman on the basis of his efficiency. It makes possible the scientific selection of workmen, i.e., the mutual adaptation of the task and the worker, and is a practical system of vocational guidance and training.

It analyzes the operations of industry into their natural parts, makes careful studies of fatigue and sets the task on the basis of a large number of performances by men of different capacities and with due and scientific allowance for the human factor and legitimate delays.

It assigns to each workman a definite and by him accomplishable task, institutes rational rest periods, and modes of recreation during the working hours, eliminates pace setters, standardizes performance, and guards the workers against over-speeding and exhaustion, nervously and physically.

It substitutes the rule of law for the arbitrary decisions of foremen, employers, and unions, and treats each worker as an independent personality.

Scientific management thus democratizes industry. It gives a voice to both parties and substitutes joint obedience of employers and workers to fact and law for obedience to personal authority. No such democracy has ever existed in industry before. Every protest of every workman must be handled by those on the management side, and the right or wrong of the complaint must be settled not by the opinion, either of the management or the workman, but by the great code of laws which has been developed and which must satisfy both sides. It gives the worker in the end equal voice with the employer; both can refer only to the arbitrament of science and fact.

5. *Scientific Management and Productive Efficiency.*—Scientific management improves and standardizes the industrial organization and equipment, betters the training of the workmen and increases their skill and efficiency.

It rationalizes the management, improves the methods of planning, routing and accounting, furnishes the best machinery, tools, and materials, eliminates avoidable wastes and standardizes the methods of work.

It gathers up, systematizes and systematically transmits to the workers all the traditional craft knowledge and skill which is being lost and destroyed under current industrial methods.

It employs in the shop a corps of competent specialists whose duty it is to instruct and train the workers, and to assist them whenever difficulties arise in connection with the work.

It trains the men in the easiest and best methods of work, and brings the workmen into close and helpful touch with the management.

It removes from each worker responsibility for the work of others, and prevents the more efficient from being held back and demoralized by the inefficient.

It increases the productive output, and improves the quality of the product.

6. *Scientific Management and Labor Welfare.*—Scientific management, through its accurate scientific methods, and the laws which it has discovered and established, its improvement of organization and equipment, and its democratic spirit:

Sets each workman to the highest task for which his physical and intellectual capacity fits him, and tends to prevent the degradation and displacement of skilled labor.

It rewards the men for helpful suggestions and improvements in the methods of work, and provides immediate inspection and immediate rewards for increased or improved output.

It requires the workers to perform, not one operation merely, but several operations or tasks.

It trains the workmen mechanically as they were never trained before, opens the way for all workmen to become "first-class men," and opens up opportunities for the advancement and promotion of the workers.

It stimulates and energizes them intellectually, and promotes their self-reliance and individuality.

It insures just treatment of individual workers, and pay to each in proportion to his efficiency.

It guarantees the worker against the arbitrary alteration of the task, arbitrary rate cutting, and limitation of earnings.

It raises wages and shortens the hours of labor.

It increases the security and continuity of employment.

It lessens the rigors of shop discipline.

It promotes friendly feeling and relations between the management and the men, and among the workers of the shop or group.

It renders collective bargaining and trade unionism unnecessary as means of protection to the workmen.

It tends to prevent strikes and industrial warfare and to remove the causes of social unrest.

Mr. Gantt, in the past, has been closely associated with Mr. Taylor, and by many is still regarded as a member of the Taylor group. His chief claims to consideration as the founder and leader of a distinct school of efficiency rest upon the emphasis which he places in his writings on the labor or humanitarian aspects of scientific management, on the instruction of workmen, and on a task and bonus system of payment to take the place of Mr. Taylor's differential piece-rate system.[1] In most essentials, Mr. Gantt accepts the Taylor claims of scientific management, and with minor exceptions, subscribes to them in detail. He has not, however, gone so far as Mr. Taylor in emphasizing the democracy of scientific management, nor has he definitely asserted that scientific management, especially through time study, has discovered and established a great code of laws which completely controls the actions of the management as well as those of the workmen.

The labor claims of scientific management made by Mr. Emerson are, in general, much less comprehensive and specific than those put forward by Mr. Taylor. This, no doubt, is due in part to the fact that Mr. Emerson does not subscribe to any definite and detailed system, but asserts that he is engaged merely in the application of fundamental principles to the industrial process.[2] On his own testimony, he has not worked out a complete set of invariable methods and devices to which he is wedded and which he is bound to defend. "We have no system," he states. "What we attempt to do is to apply certain principles. We are willing to adopt any methods, any device, if it is advantageous."[3] While, therefore, Mr. Emerson says much of principles, when he leaves the discussion and comes down to the actual practice of scientific management, his claims are much less detailed and rigid than those of Mr. Taylor. He takes it for granted that "the ideal is never attained."[4] In fact, he deprecates the idea that "shops can be found which will exactly represent the different systems." He admits that he has never been able to install more than a small fraction of what he should call "Emerson Company methods," and in his belief there is not more than one existing plant "which represents the ideas of any scientific manager unless it be some shop where the system was put in by the manager himself and, therefore, represents his ideas."[1]

---

[1] It may be noted that the members of the Taylor group have generally adopted these modifications, at least, in theory.

[2] It should not be inferred from this statement that Mr. Emerson bases his work more on fundamental principles than Mr. Taylor, nor that Mr. Taylor would insist on any invariable set of forms, blanks, etc.

[3] United States Commission on Industrial Relations Hearings, p. 1432.

[4] Interview with the writer, Nov. 18, 1914.

It has been found impossible, therefore, to secure from Mr. Emerson personally or through what he has written any concrete systematic statement of his own labor claims or any definite and positive comment upon all the points covered by the labor claims of scientific management as authenticated by Mr. Taylor. He is probably in substantial accord with Mr. Taylor in many of his detailed claims, as evidenced by his failure to make positive objections to them when they were presented for his criticism. With respect to more fundamental matters, Mr. Emerson expresses a qualified belief in industrial democracy, in the possibility of exact scientific knowledge, and in the potency of natural law in industrial affairs. Doubtless, however, he would not subscribe without reserve to Mr. Taylor's positive claims for scientific management covering these matters, nor would he hold that scientific management always and of necessity deals out exact justice to the worker.

3. THE TRADE UNION OBJECTIONS TO SCIENTIFIC MANAGEMENT

It would be a grievous mistake to assume that organized labor, as a whole, is more consistent in positive theory and in viewpoint than scientific management. Trade unions are essentially opportunistic, they present vitally different types, their most general organization is little more than a loose affiliation of sovereign bodies, there is no individual or group which has unchallenged authority or right to speak for the organic unit or the individual, and none which can be held responsible for the pronouncements of all those who as union men have raised their voices in protest against scientific management. No consistent or strictly authoritative statement of the trade union position relative to scientific management can, therefore, be made.

---

[1] Interview with the writer, Nov. 18, 1914.

There is one body, however, which far more than any other, can claim the right to voice the prevailing sentiment of organized labor in America. This body is the Executive Council of the American Federation of Labor. Its members are the elected representatives of nearly two and one-half millions of workers, and its president, Mr. Samuel Gompers, has for many years been recognized as the leading exponent of labor thought and a most vital force in the molding of labor opinion. This Council has itself put forth no systematic statement of organized labor's objections to scientific management, but the writer was able to secure through a committee of its appointing and through its officers, a careful revision of his own systematized compilation of those objections, drawn from all available sources. This statement he feels justified, therefore, in regarding as the nearest possible approach at present to an authoritative presentation of the trade union objections to scientific management. While it contains some charges authenticated merely as the expression of individual opinion to which the Council itself does not subscribe, in the main, the statement may be taken as representing the definite attitude of the best informed and most influential group in organized labor toward scientific management and its methods.

Like the labor claims of scientific management, the trade union objections to scientific management cover too large a number of general and specific points to warrant presentation in detail. On the other hand, their character and range are such as to preclude the possibility of condensation in a way to bring out fully and forcibly labor's multifarious grounds of opposition. The following brief statement, however, may serve as an indication of its general attitude and charges.[1]

1. The General Definition of Scientific Management.—Organized labor understands by the term, "scientific management," certain well-defined "efficiency systems" which have been recently devised by individuals and small groups under the leadership and in imitation of men like Frederick W. Taylor, H. L. Gantt and Harrington Emerson, by whom this term has been preëmpted. Organized labor makes a clear distinction between "scientific management" thus defined and "science in management." It does not oppose savings of waste and increase of output resulting from improved machinery and truly efficient management. It stands, therefore, definitely committed to "science in management," and its objections are directed solely against systems devised by the so-called "scientific management" cult.

2. Scientific Management in Its Relation to Labor Welfare.—"Scientific management" thus defined is a device employed for the purpose of increasing production and profits; and tends to eliminate consideration for the character, rights and welfare of the employees.

It looks upon the worker as a mere instrument of production and reduces him to a semi-automatic attachment to the machine or tool.

In spirit and essence, it is a cunningly devised speeding-up and sweating system, which puts a premium upon muscle and speed rather than brains, forces individuals to become "rushers" and "speeders"; stimulates and drives the workers up to the limit of nervous and physical exhaustion and over-speeds and over-strains them; shows a constant tendency to increase the intensity and extent of the task; tends to displace all but the fastest workers; indicates a purpose to extract the last ounce of energy from the workers; and holds that if the task can be performed it is not too great.

---

[1] The full statement of the trade union objections to scientific management will be found in Appendix V.

It intensifies the modern tendency toward specialization of the work and the task; is destructive of mechanical education and skill; splits up the work into a series of minute tasks tending to confine the workers to the continuous performance of one of these tasks; tends to eliminate skilled crafts; deprives the worker of the opportunity of learning a trade; degrades the skilled workers to the condition of the less skilled; displaces skilled workers and forces them into competition with the less skilled, and narrows the competitive field and weakens the bargaining strength of the workers through specialization of the task and the destruction of craft skill.

It displaces day work ,and day wage by task work and the piece-rate, premium and bonus systems of payment.

It tends to set the task on the basis of "stunt" records of the strongest and swiftest workers without due allowance for the human element or legitimate delays, so that only a few of the strongest and most active workers are capable of accomplishing it, and has devised and established modes of payment, usually arranged so that it is greatly to the advantage of the employer to prevent the workers from equaling or exceeding the task, and which usually result in giving the worker less than the regular rate of pay for his extra exertion, and only a portion and usually the smaller portion of the product which his extra exertion has created.

It establishes a rigid standard of wages regardless of the progressive increase in the cost of living, and tends to make it permanent at its present low level; puts a limit upon the amount of wages which any man can earn; offers no guaranteee against rate cutting; is itself a systematic rate-cutting device; tends to lower the wages of many immediately and permanently, and means in the long run more work for the same or less pay.

It tends to lengthen the hours of labor; shortens the tenure of service; lessens the certainty and continuity of employment; and leads to over-production and the increase of unemployment.

It condemns the worker to a monotonous routine; tends to deprive him of thought, initiative, sense of achievement and joy in his work; dwarfs and represses him intellectually; tends to destroy his individuality and inventive genius; increases the danger of industrial accidents; tends to undermine the worker's health, shortens his period of industrial activity and earning power, and brings on premature old age.

It puts into the hands of employers at large an immense mass of information and methods which may be used unscrupulously to the detriment of the workers, creates the possibility of systematic blacklisting, and offers no guarantee against the abuse of its professed principles and practices.

3. Scientific Management in Its Relation to Industrial Democracy.—"Scientific management" is undemocratic; it is a reversion to industrial autocracy which forces the workers to depend upon the employers' conception of fairness and limits the democratic safeguards of the workers.

It tends to gather up and transfer to the management all the traditional knowledge, the judgment and the skill of the workers and monopolizes the initiative and skill of the workers in connection with the work.

It allows the workman ordinarily no voice in hiring or discharge, the setting of the task, the determination of the wage rate or the general conditions of employment.

It greatly intensifies unnecessary managerial dictation and discipline; tends to prevent the presentation and denies the consideration of grievances; and tends to increase the number of shop offenses and the amount of docking and fining.

It introduces the spirit of mutual suspicion and contest among the men, and thus destroys the solidarity and cooperative spirit of the group.

It has refused to deal with the workers except as individuals.

It is incompatible with and destructive of unionism; destroys all the protective rules established by unions and discriminates against union men.

It is incompatible with and destructive of collective bargaining.

4. The Unscientific Character of Scientific Management.—"Scientific management" in its relations to labor is unscientific.

It does not take all the elements into consideration but deals with human beings as it does with inanimate machines.

It violates the fundamental principles of human nature by ignoring habits, temperament, and traditions of work and tends to minimize the acquired skill of the workers.

It greatly increases the number of "unproductive workers," i.e., those engaged in clerical work, and often squeezes out of the workers vast overhead charges.

It is unscientific and unfair in its determination of the task and furnishes no just or scientific basis for calculating the wage rate.

It concerns itself almost wholly with the problem of production, disregarding in general the vital problem of distribution, and violates and indefinitely postpones the application of the fundamental principle of justice to distribution.

It is based on the principle of the survival of the fittest and tends to disregard the physical welfare of the workers.

5. The Inefficiency of Scientific Management.—"Scientific management" is fundamentally inefficient.

It does not tend to develop general and long-time economic efficiency.

It tends to emphasize quantity of product at the expense of quality, and to reduce the quality of the work and output.

It is incapable of extensive application.

It is a theoretical conception already proven a failure in practice.

6. Scientific Management and Industrial Unrest.—"Scientific management" intensifies the conditions of industrial unrest.

It libels the character of the workmen, and its methods are evidence of suspicion and direct question of the honesty and fairness of the workers.

It fails to satisfy the workers under it, but, on the contrary, is regarded by them with extreme distaste.

It pits workman against workman; displaces harmony and coöperation among the working group by mutual suspicion and controversy, and increases the antagonism between the workers and their employers.

It increases the points of friction and offers no guarantee against industrial warfare and is conducive to strikes.

APPENDIX I

CONCLUSIONS RESULTING FROM THE INVESTIGATION[1]

In the following[2] pages, your investigator and his official experts have endeavored to set forth as briefly as may be, with due regard to the variety and shadings of the data involved, the facts as they have found them bearing on the relations of scientific management to labor, both organized and unorganized.

Two essential points stand forth. The first point is that scientific management, at its best and adequately applied, exemplifies one of the advanced stages of the industrial revolution which began with the invention and introduction of machinery. Because of its youth and the necessary application of its principles to a competitive state of industry, it is, in many respects, crude, many of its devices are contradictory of its announced principles, and it is inadequately scientific. Nevertheless, it is to date the latest word in the sheer mechanics of production and inherently in line with the march of events.

Our industries should adopt all methods which replace inaccuracy with accurate knowledge and which systematically operate to eliminate economic waste. Scientific management, at its best, has succeeded in creating an organic whole of the several departments of an institution, establishing a coördination of their functions which had previously been impossible, and, in this respect, it has conferred great benefits on industry. The social problem created by scientific management, however, does not lie in this field. It is in its direct and indirect effects upon labor that controversy has arisen, and it was in this field that the investigation was principally made. For the present, the introducers and appliers of scientific management have no influences to direct them, except where labor is thoroughly organized, other than their ideals, personal views, humanitarianism or sordid desire for immediate profit with slight regard for labor's welfare.

---

[1] As reported to the Commission on Industrial Relations.

[2] In the report to the Commission on Industrial Relations, this section stood first in order.

The second point is that neither organized nor unorganized labor finds in scientific management any adequate protection to its standards of living, any progressive means for industrial education, or any opportunity for industrial democracy by which labor may create for itself a progressively efficient share in efficient management. And, therefore, as unorganized labor is totally unequipped to work for these human rights, it becomes doubly the duty of organized labor to work unceasingly and unswervingly for them, and, if necessary, to combat an industrial development which not only does not contain conditions favorable to their growth, but, in many respects, is hostile soil.

Your investigator and his official experts are of the opinion that all the data focus in these two points, each in its own way equally vital, equally indestructible and equally uncompromising. On the one hand, the right of investigation, perpetual desire and experiment to find new ways of doing things, knowledge, science, efficiency—all these—advance in the apparent nature of our world, sometimes with a beneficent front, sometimes as a Frankenstein, temporarily destructive of human rights. On the other hand, these very human rights are unquenchable, for in the long run they contain the very life of true efficiency itself.

The fact to face is that your Commission is dealing in this matter with two forces, neither of which may nor will be sacrificed to the other. Also, conflict between them would simply be marking time against the inevitable. It is inherent in the nature of things that they both live and fructify.

How then may they develop together? The solution must lie in practical experiments to which a great Federal body like yours is most competent to give sanction. You can lay down such principles of experimentation as may be applied to safeguard the rights of both forces. But this is a subject for far broader and deeper deliberation than the pages of this report are competent to outline. Scientific management is but one factor in the broad industrial problem.

(*Signed*): Robert F. Hoxie, Investigator.
Robert G. Valentine, Expert on Employing Management.
John P. Frey, Labor Expert.

APPENDIX II

THE LABOR CLAIMS OF SCIENTIFIC MANAGEMENT ACCORDING TO MR. FREDERICK W. TAYLOR

A. Labor Claims of Scientific Managers Touching the General Character and Spirit of Scientific Management

The scientific managers claim that:

1. Scientific management is a system devised by industrial engineers for the purpose of subserving the common interests of employers, workmen and society at large through the elimination of avoidable wastes, the general improvement of the processes and methods of production, and the just and scientific distribution of the product.
2. Scientific management is based upon the fundamental assumption of harmony of interests between employers and workers, and seeks to establish complete and harmonious coöperation between them.
3. Scientific management attempts to substitute, in the relations between employers and workers, the government of fact and law for the rule of force and opinion. It substitutes exact knowledge for guesswork, and seeks to establish a code of natural laws equally binding upon employers and workmen.
4. Scientific management thus seeks to substitute in the shop discipline, natural law in place of a code of discipline based upon the caprice and arbitrary power of men. No such democracy has ever existed in industry before. Every protest of every workman must be handled by those on the management side and the right or wrong of the complaint must be settled, not by the opinion either of the management or the workmen but by the great

code of laws which has been developed and which must satisfy both sides.

5. Scientific management, perforce, accepts the modern tendency toward specialization caused by machine production, but seeks to mitigate its possible evil effects upon the workers:
    - *a*. By gathering up, systematizing and systematically *transmitting* to the workers all the traditional craft knowledge and skill which is being lost and destroyed under current industrial methods.
    - *b*. By employing in the shop a corps of competent specialists whose duty it is to instruct and train the workers, and to assist them whenever difficulties arise in connection with the work.
    - *c*. By analyzing the operations of industry into their natural parts and assigning to each workman a definite and by him accomplishable task.
    - *d*. By bringing the workmen thus constantly into close, systematic, and helpful touch with the management.
    - *e*. By requiring the workmen to learn and to perform not one merely but several operations or tasks.
    - *f*. By treating each worker as an independent personality.
    - *g*. By rewarding the men for helpful suggestions and improvements in the methods of work.
    - *h*. By opening up opportunities for the advancement and promotion of the workers.
6. Scientific management seeks to eliminate overstimulation, overspeeding, and nervous and physical exhaustion of the workers:
    - *a*. By substituting exact knowledge based upon a careful study of men and machines for guesswork in the setting of the task, and the determination of the hours and other conditions of work.
    - *b*. By eliminating thus the need for the employment of pace makers.
    - *c*. By transferring from the workers to the management responsibility for contriving the best methods of work.
    - *d*. By removing from each worker responsibility for the work of others and for the instruction of beginners and helpers.

  e. By maintaining the best conditions for performing the work through furnishing the best tools and materials at the proper time and place.
  f. By training the workers in the most economical and the easiest methods of performing operations.
  g. By standardizing equipment and performance.
  h. By instituting and enforcing rational rest periods and modes of recreation during the working hours.
  i. By surrounding the workers with the safest and most sanitary shop environment.

7. Scientific management makes possible the scientific selection of workmen, i.e., the mutual adaptation of the task and the worker.

8. Scientific management is thus a practical system of vocational guidance and training, and opens the way for all workmen to become "first-class" men.

9. Scientific management pays workers rather than positions; it remunerates each man according to his efficiency.

10. Scientific management eliminates systematic soldiering, and thus the hampering and discouraging of the strong and willing by the weak and unwilling.

11. Scientific management, by these methods, seeks to secure more efficiency with less effort, to increase the product which may be shared by employers and laborers, to raise wages while lowering the labor cost, and to place both production and distribution upon a scientific and just basis.

B. *Labor Claims of Scientific Managers Concerning the Effects of Scientific Management upon the Conditions of Work and the Character and Welfare of the Workers, Industrially and Socially.*

1. Scientific management develops and promotes a friendly feeling and relationship between the management and the men.
  a. The men are not soured, as under the old form of management, by:
    (1) The arbitrary bullying of foremen.

        (2) The injustice in the method and amount of remuneration.
        (3) The lack of proper tools and materials at the proper time and place for doing the work, and other delays and breakdowns over which they have no control.
        (4) The absence of proper instructions and guidance.
        (5) The necessity of doing work and assuming responsibility properly belonging to the management.
    b. They do not spend time in criticizing the management.
    c. They are satisfied with the conditions of work and pay.
    d. They, consequently, look upon their employers as their best friends.
2. Scientific management promotes friendly feeling and action among the workers in the shop or group.
    a. It eliminates the irritation caused by the soldiering and poor work of individuals in the group.
    b. It eliminates the ill feeling caused by parasitism and advancement and remuneration by favoritism.
    c. It eliminates the irritation caused by rules which prevent the ambitious and efficient workers from doing their best and being paid accordingly.
    d. It eliminates the suspicion and ill feeling caused by the employment of pace makers.
    e. The men, consequently, work more cheerfully and are more helpful than under the old form of management.
3. Scientific management stimulates and energizes the workers intellectually:
    a. By bringing the workers into constant, close and helpful touch with the management; by its systematic transmission to the workers of industrial knowledge; by its definite instructions; by assigning to each worker a definite and accomplishable task; by requiring the worker to perform, not one but several operations wherever possible; by rewarding the men for usable suggestions and improvements; by opening up opportunities for advancement or promotion; by instituting rational periods of rest and recreation;

by treating each worker as an independent personality; by paying each man according to his efficiency:
  (1) Stimulates the thought and ambition of the workers.
  (2) Mitigates the monotony incident to modern machine industry.
  (3) Develops the workers' sense of personal achievement.
  (4) Puts interest, joy and zest into the work.
  (5) Develops and broadens the mechanical skill of the workers.
  (6) Stimulates the workers' inventive genius.
  (7) Promotes the workers' self-reliance, self-respect, individuality, personality and dignity.

4. Scientific management guards the workers against overspeeding and exhaustion, nervously and physically:
  a. By substituting exact knowledge for guesswork in the setting of the task.
  b. By removing the suspicions of the employers that the workers are soldiering.
  c. By tending to prevent ignorant bidding and cut-throat competition.
  d. By eliminating pace setters and turning speeders into instructors.
  e. By training the men in the easiest methods of work.
  f. By careful studies of fatigue and the setting of the task on the basis of a large number of performances by men of different capacities, and with due scientific allowance for the human factor and legitimate delays.
5. The so-called speeding-up of scientific management is, in the main, a speeding-up of machinery, requiring no extra exertion on the part of the workers. The speed of the men is determined by psychological and physical tests, and is always set with reference to long-time results. Scientific management challenges anyone to show any overstrained or overworked man in the scientific management shops.
6. Scientific management insures just treatment of individual workers, and lessens the rigors of shop discipline.

a. By keeping records of conduct and exact performance.
b. By substituting the rule of law for the arbitrary decisions of foremen, employers and unions.
c. By giving to the worker in the end equal voice with the employer. Both can refer only to the arbitrament of science and fact.

7. Scientific management increases the skill, efficiency and productivity of the workers:
   a. By the scientific selection of workmen so that each man is set to the highest task for which his physical and intellectual capacity fits him.
   b. By providing each worker with the best means and methods of work.
   c. By educating and training the workers mechanically as they were never trained before.
   d. By training the workers in the easiest and best methods of work.
   e. By providing immediate inspection and immediate rewards for increased or improved output.
   f. By energizing the workers intellectually.
   g. By preventing the more efficient from being held back and demoralized by the inefficient.
   h. By raising thus the old age limit.
8. Scientific management improves the quality of the product:
   a. By improved methods of instruction and inspection.
   b. By endeavoring to set a task that will show proper relation between quantity and quality.
9. Scientific management tends to shorten the hours of labor.
10. Scientific management improves the conditions of sanitation and safety in the shop.
11. Scientific management by all these means and methods:
    a. Improves the workers' health.
    b. Lengthens the workers' lives and period of earning capacity.
12. Scientific management, through its general spirit and its systems of wage payment, prevents arbitrary rate cutting and the placing of any arbitrary limit upon the amount which any worker may earn. Under scientific management, the rate is never cut without an absolute

change in the directions governing the work and the time demanded for doing it.

13. Scientific management raises wages.
    - *a.* It directly and immediately increases the wages of the workers in scientific management shops from 30% to 100%.*
    - *b.* It raises the wages of the unskilled by enabling them to do work formerly done only by skilled men.
    - *c.* It raises the wages of skilled workers by opening up opportunities for advancement and promotion.
    - *d.* It tends to raise wages generally:
        - (1) By broadening the field of industrial activity and increasing the efficiency of the workers.
        - (2) By increasing the total output and thus the general demand for labor.
14. Scientific management tends to prevent the displacement and degradation of skilled labor which is a natural concomitant of developing machine industry:
    - *a.* By broadening and improving the mechanical training and skill of the workers.
    - *b.* By giving time for adjustment to changed industrial conditions.
    - *c.* By opening up new fields of work and extensive opportunities for advancement and promotion.
15. Scientific management tends to increase the employment of labor in the trades where it is installed by cheapening and thus increasing the demand for the product.
16. Scientific management tends to lessen the dangers of general unemployment:
    - *a.* By the scientific selection and training of the workers so that each one may find the work for which he is best fitted and thus may become a first-class worker in it.
    - *b.* By making possible a more accurate adjustment of supply to demand and so tending to eliminate crises and depression.
    - *c.* By increasing production and so the demand for labor.
17. Scientific management lessens the necessity for a shop reserve of workers and lessens the number of part-time men.

18. Scientific management increases the security and continuity of employment. The term of employment is longer and there is less shifting of employees in scientific management shops than in ordinary shops.
19. Scientific management thus betters the industrial condition of both skilled and unskilled labor.
20. Scientific management makes collective bargaining and trade unionism unnecessary as means of protection to the workers.
21. Scientific management, however, welcomes the coöperation of unionism.
22 Scientific management tends to prevent strikes and industrial warfare.
23. Scientific management elevates the workers morally and socially. The workers under scientific management live better and tend to become more temperate and saving.
24. Scientific management democratizes industry; it gives a voice to both parties and substitutes the joint obedience of employers and workers to fact and law for obedience to personal authority.
25. Scientific management tends to remove the causes of social unrest.

C. *Labor Claims of Scientific Managers Touching Certain Specific Features and Methods of Scientific Management*

In this connection, the scientific managers claim that:

1. Time and motion study is the accurate, scientific method by which the great mass of laws governing the best and easiest and most productive movements of men are investigated. These laws constitute a great code, which, for the first time in industry, completely controls the acts of the management, as well as those of the workmen; and, therefore [these laws]:
    a. Are necessary to secure efficiency, and, therefore, justice, to the workers, and improvement in the wages and conditions of employment.
        (1) They substitute exact knowledge for prejudiced opinion and force in determining all the conditions of work and pay.

Thus they make possible and are necessary to:

(a) The adaptation of the task to the intellectual and physical capacity of the workers.

(b) The payment of the workers in exact proportion to their efficiency.

(c) The most efficient methods of performing the task.

(d) The best conditions of work through the proper routing of the jobs and materials.

(e) The elimination of systematic soldiering.

(f) The elimination of the suspicions of the employers that the workers are gaining an unfair advantage.

(2)[1] They substitute exact knowledge for ignorance in accounting and bidding. Thus they alone:

(a) Make possible exact cost accounting.

(b) Make possible the elimination of ignorant and cut-throat competition.

(3) Time and motion study thus:

(a) Is essential to the maximum of industrial and commercial efficiency, and, therefore, of wages.

(b) Eliminates the chief causes of speeding-up, and the arbitrary alteration of the task.

(c) Eliminates the chief causes of rate cutting.

b. Time and motion study, with the use of the stop-watch, is not objected to by the workers, when its purposes are properly explained and understood by the workers, and when used openly and above-board by men whose knowledge and ability the workers respect.

2. Task setting and the methods of payment employed by scientific management stimulate and energize the workers intellectually and are essential to maximum efficiency, maximum wages, and justice and fair dealing between employers and workers.

a. Scientific task setting

(1) Makes possible the mutual adaptation of the man and the work.

(2) Promotes the training of the worker, and

---

[1] In connection with this section, Mr. H. K. Hathaway says: (a) Make possible accurate cost prediction. (b) The elimination of ignorant competition.

    makes it possible for every man to become "first-class" in some employment.
  - (3) Puts zest into the work and gives a sense of achievement.
  - (4) Eliminates the use of pace makers.
  - (5) Promotes the workers' self-reliance and individuality.

b. The modes of payment employed by scientific management:

  - (1) Insure pay according to efficiency, and thus
    - (a) Tend to eliminate soldiering.
    - (b) Eliminate the need for pace setters.
    - (c) Turn foremen into instructors.
    - (d) Increase efficiency and output.
  - (2) Increase wages.
  - (3) Tend to guarantee against rate cutting.
  - (4) Secure justice for each worker.
  - (5) Promote friendly relations between the employers and workers; prevent suspicion and complaints.
  - (6) Promote friendly relations among the workers.
  - (7) Develop the individuality of the workers.

APPENDIX III

THE LABOR CLAIMS OF SCIENTIFIC MANAGEMENT ACCORDING TO MR. H. L. GANTT

The scientific management labor claims of Mr. H. L. Gantt are practically identical with those of Mr. Taylor, presented in Appendix II, except for the following omissions and substitutions.

(Marginal figures refer to the correspondingly numbered paragraphs of the Taylor labor claims).

A. 4. Omit the statement: "No such democracy has ever existed in industry before. Every protest of every workman must be handled by those on the management side, and the right or wrong of the complaint must be settled, not by the opinion either of the management or the workmen, but by the great code of laws which has been developed, and which must satisfy both sides."

B. 12. Omit: "Under scientific management, the rate is never cut without an absolute change in the directions governing the work and the time demanded for doing it."

C. 1. Omit: "Time and motion study is the accurate scientific method by which the great mass of laws, governing the best and easiest and most productive movements of men, are investigated. These laws constitute a great code, which, for the first time in industry, completely controls the acts of the management as well as those of the workmen, and, therefore [these laws]:

a. Are necessary to secure efficiency, and, therefore, justice to the workers, and improvement in the wages and conditions of employment."

C. 1. And substitute: "Time and motion study:

a. Is necessary to secure efficiency, and, therefore, justice to the workers and improvement in the wages and conditions of employment."

C. 1. a.(2)(a) Substitute: "They make possible exact cost estimating" for "They make possible exact cost accounting."

In addition to the above, Mr. Gantt regards A. 10 as "true, but not particularly important."

APPENDIX IV

THE LABOR CLAIMS OF SCIENTIFIC MANAGEMENT ACCORDING TO MR. HARRINGTON EMERSON

In the following presentation of the Emerson labor claims, the general order and the main headings of the Taylor statement have been retained to facilitate the process of comparison.

(Marginal figures refer to the correspondingly numbered paragraphs of the Taylor labor claims.)

A. LABOR CLAIMS OF SCIENTIFIC MANAGERS TOUCHING THE GENERAL CHARACTER AND SPIRIT OF SCIENTIFIC MANAGEMENT

1. The General Definition of Scientific Management.—Mr. Emerson states that he does not "care for" the definition of scientific management authenticated by Mr. Taylor. He offers no positive suggestions for the revision of this definition. In a statement to the United States Commission on Industrial Relations, however, he says: "As I understand scientific management . . . it is the subjection of materials, equipment and personnel, including all managers, to the highest economic laws in order that the universe through human ability may give more of its inexhaustible riches to humanity."[1]

A study of Mr. Emerson's writings leads to the assumption that the following would be a characteristic statement: Scientific management is an attempt to secure economic efficiency through the application to industrial and commercial practice of ideals, common sense, competent counsel, discipline, the fair deal, efficiency reward, records—reliable, immediate and adequate—planning and despatching, standards and schedules, standardized operations and written standard-practice instructions.

---

[1] *Efficiency and Modern Civilization,* before the United States Commission on Industrial Relations, Washington, D. C., April 14, 1914 (Sect. 252).

3. The Alleged Laws of Scientific Management and the Control which these Laws are Assumed to Exercise over Employers and Workers.—Although Mr. Emerson makes the idea of economic law central in his definition of scientific management, he does not like Mr. Taylor's claim that scientific management has succeeded in developing a code of natural laws which "completely controls the acts of the management as well as those of the workmen." On the contrary, he recognizes that no system can be devised which cannot be beaten by the unfair employer. Scientific management, he admits, "is a tool, an instrument that can be just as easily applied by outsiders for bad as for good purpose."[1] "There are indeed employers who are constantly scheming to put something over on the worker, on their partners, on investors, on the public. . . . Scientific as a rolling pin in the clench of an exasperated woman, or as management, in the hands of such men, may be as dangerous a torch in a maniac's hand in a powder magazine, or as a strong ship with a pirate crew. Mathematics may be used to defraud a man as well as to add up pay rolls correctly."[2]

4. *Scientific Management and Shop Discipline.*—Mr. Taylor emphasizes the idea that discipline in the scientific management shops is the reflex of natural law rather than the application of the arbitrary power of men. He says that scientific management "seeks to substitute in the shop discipline natural law in place of a code of discipline based upon the caprice and arbitrary power of men." "Every protest of every worker must be handled by those on the management side and the right or wrong of the complaint must be settled, not by the opinion of either the management or the men, but by the great code of laws which has been developed."

Mr. Emerson makes no positive objections to these statements but appears to rely more upon personality and persuasion than upon natural law for disciplinary results. In the matter of discipline he wants each man "to make the other responsible."[1] "The spirit which is wanted in the shop results from a sense of mutual dependence and help."[1] He says that "he personally objects to the method of force though he may have to put on force once in a while."[1] "However, in America, you cannot say to a man: 'I will make you.'" "You cannot get the best out of a man and not give him oats."[1]

---

[1] Interview with writer, Nov. 18, 1914.

[2] *Efficiency and Modern Civilization*, before the United States Commission on Industrial Relations, Washington, D. C., April, 1914 (Sect. 286, 288, 289).

4. *The Alleged Democratic Character of Scientific Management.*—Mr. Emerson does not appear to be altogether in harmony with Mr. Taylor's statement respecting scientific management that "no such democracy has ever existed in industry before. It gives to the worker in the end equal voice with the employer; both can refer only to the arbitrament of science and fact." Mr. Emerson recognizes that scientific management may or not be democratic. "There are four ways," he says, "of getting what you want: (1) By finding or discovering it; (2) By persuasion; (3) By purchase; and (4) By force."[1] "Scientific management may be employed as an instrument for any of these methods."[1] His own method, he asserts, however, "is that of discovery, persuasion, and purchase."[1] He personally "objects to force."[1] "He would be willing to leave the matter of changing rates to keep them fair to a committee of the workmen," but "he would want to exercise the right of veto."[1] "The government necessarily rests with the management."[1]

5. *Scientific Management and the Modern Tendency Toward Specialization.*—Mr. Emerson does not "care for" the Taylor statements under this heading:[1]

5. *g.* Rewards to workers for usable suggestions.

Mr. Emerson expresses himself as "constitutionally opposed to offering the men rewards for suggestions" . . . "he does reward the workers but he makes no promises."[1] His reason is not a desire "to take from the men what belongs to them, but such a promise violates the spirit of the plant,"[1] and, furthermore, cannot be redeemed. He wants "every one to work in the spirit of helpfulness, not in the spirit of bargaining";[1] he wants the "spirit of coöperation," "the spirit of the hive." "Any method that causes the men to keep back what is for the good of the plant as a whole is a bad one."[1]

---

[1] Interview. Nov. 18, 1914.

Beyond this there is, according to Emerson, a very practical reason for withholding the promise of rewards for suggestions made, viz., that "adequate rewards are impossible." "The great asset of a plant is the unrewarded and unpaid knowledge of the workers and it would bankrupt a plant to pay for all this."[1]

6. The Alleged Elimination of Over-stimulation and Speeding Under Scientific Management.—Mr. Emerson objects to the inference that scientific management eliminates the stimulation and speeding-up of the workers. The statement found in the Taylor labor claims is "too soft." He admits that scientific management "is a speeding-up system,"[2] and asserts that "for one man who is overstimulated and consequently exhausted, a thousand rust out under any management."[2] "There is a rational time and speed for every movement and most people are too slow." "The great thing is to stimulate them all you can, and then you don't get the best." "The endeavor of scientific management is to speed every one up to the maximum point which he can maintain continuously with benefit to himself and the operation in which he is engaged." "The whole advance of centuries depends upon using the human energies to make use of accumulated resources."[2] "We do not want laggards. Most of us are too flabby. We need a punch." "I have not the slightest sympathy with the wail about speeding-up."

In mitigation of these somewhat harsh statements, Mr. Emerson says, however, that "the employer has no right to ask a man to do more than a fair amount."[2] "The worker is stimulated because of the reciprocal exchange of experience and knowledge." "The effort," he says, "is to put men into work in which they can take joy. It is hard to exhaust them if this is done."[2]

6. b. The Alleged Elimination of the Need for Pacemakers under Scientific Management.—Mr. Emerson objects to the statement on this head authorized by Mr. Taylor to the effect that scientific management eliminates the need for pacemakers. He "wants always a pacemaker."[1] The reason is that he

---

[1] Interview, Nov. 18, 1914.

[2] Interview, Nov. 18, 1914, and formal statement submitted to investigator.

"places the standard at 50% of the fastest," and "wants the pacemaker to check up with."[1]

6. c. The Transference under Scientific Management of Traditional Craft Knowledge from the Management to the Men.—Mr. Emerson repudiates the word "transfer" as used in this connection. "The exchange of knowledge under scientific management," he says, is "reciprocal."[1] He does not like the attitude of superiority on the part of the management. He "gives instructions to the engineer when to start and when to get there, but he does not give a . . . how he gets there"; he "wants the men to tell him."[1]

6. d. The Alleged Removal from the Workers under Scientific Management of Responsibility for the Work of Others and for the Instruction of Beginners and Helpers.—Mr. Emerson does not agree with Mr. Taylor at this point. He "wants each man to make the other responsible"[1] though, "of course, he does not want a man to be responsible for conditions which he cannot control."[1]

7. Scientific Management and Scientific Selection and Adaptation of the Workmen.—Mr. Taylor states that scientific management makes possible the scientific selection of workmen, i.e., the mutual adaptation of the task and the worker. Mr. Emerson says that he "does not see this in the slightest degree."[1] However, he states that he would "endeavor to so place each man that the work would give him pleasure and be fitted for him physically, mentally, and morally and permanently so."[1] Moreover, Mr. Emerson has a somewhat elaborate theory of selection and strong feeling in regard to the necessity and justification for careful elimination of the unfit workers. He would "erect certain screens between the workers and employment in the shop."[1] These screens are "health, intelligence, honesty (reliability), industry, temperament, aptitude, experience."[1] "With the proper use of these screens, it is almost impossible for a man who is unfitted to get into the shop."[1] Further, Mr. Emerson claims to apply the same rules to the selection of men that he does to the selection of materials; "designs, specifications, testing, tenders (bids); custody (storing and care), operation and inspection."[1] He expresses himself, moreover, very strongly in regard to the desirability and justification for careful selection of workers so as to rule out the relatively incompetent. "I do not want them," he says, "I want to give them a jolt."[1] "If I had work for only 100 men, why should I not have the best 100?"[1] "Scientific management here is only the special application of universal truth."[1] "The human race has no license from the Almighty to suppress the law of the survival of the fittest."[1] Therefore, if he were running a plant, Mr. Emerson "would be very careful whom he let in as a worker."[1] He "does not propose to let in the incompetents."[1] "It is the business of those in the shop to shut them out."[1] "If they are unhealthy, they belong in the hospitals; if they are vicious, they belong in jails; if they are lazy, they belong in the bread line; if they are indigent, they belong in the poorhouse."[1] "A small body of highly efficient men is better than a large body of inefficients."[1] Practically, where incompetents are eliminated, "it is sometimes a matter of securing salvage, where otherwise the business would be a total wreck."[1]

---

[1] Interview, Nov. 18, 1914.

Mr. Emerson makes much use of character analyses and has availed himself of the methods of Dr. Katharine Blackford. "I have found," he states, "that having a character analysis before me warns me in regard to some quality which I should not discover immediately and so I am saved from errors and difficulties in dealing with men."[1] "Whether we think that Mrs. Blackford's system is good or not, the fact is that at . . . she never allowed a labor agitator to get past her into the shop."[1]

However, Mr. Emerson says that "he rarely, if ever, calls upon the management to discharge men. The result desired can be secured by hiring men of better grade as those of poorer grade drop out."[1] But he admits that "a high degree of selection results from the application of his system."[1] "The inefficients are eliminated."[1]

8. Scientific Management in Relation to Vocational Selection, Guidance and Training.—Mr. Emerson deprecates the statement of Mr. Taylor that scientific management is a system of vocational selection. "The selection of employees," he asserts, "is not and has not been a branch of shop management."[1] "The whole vocational business comes before scientific management."[1] He "selects his men as he does his materials."[1] "Of course," he admits, "we are all engaged in sizing up men as we are talking to them, but we are not able to size them up except in regard to superficial characteristics."[1]

---

[1] Interview, Nov. 18, 1914.

10. Scientific Management and the Elimination of Soldiering.—Mr. Emerson does not deny the truth of the Taylor statement that scientific management eliminates systematic soldiering and the systematic hampering of the strong and willing by the weak and unwilling but declares that this "is relatively unimportant."[1]

11. The General Aims of Scientific Management.—In place of Mr. Taylor's statement that scientific management seeks to secure more efficiency with less effort, to increase the product which may be shared by employers and laborers, to raise wages while lowering labor cost, and to place both production and distribution upon a scientific and just basis, Mr. Emerson would substitute the following: "The ideal of a good manager is to give to the public more service for less pay; the public will respond by taking more of his product; he gives the worker higher pay per hour; the workers respond by giving greater effort and lowering unit cost. He gives the investor greater security and wider opportunity, not the highest returns; the investor responds by lowering the rate of interest; after he has done these things, the surplus is the special reward of special skill in management."[1]

Mr. Emerson criticizes the Taylor assemblage of scientific management labor claims made under this main heading on the ground that "in general, there are many other things just as important as those here stated." What these other things are, specially indicative of the character and spirit of scientific management, he does not say but, on the whole, we may infer that he regards the whole Taylor system of claims as too positive and rigid. In a supplementary statement submitted, he says: "In my limited work, I attempt to create an organization founded on basic principles (to handle materials, men and equipment). I make no rules, I create nothing. I merely attempt to live in accordance with the rules that I find already operating in the universe. . . . Little differences do not disturb me."[1]

[1] Interview, Nov. 18, 1914.

B. LABOR CLAIMS OF SCIENTIFIC MANAGERS CONCERNING THE EFFECTS OF SCIENTIFIC MANAGEMENT UPON THE CONDITIONS OF WORK AND THE CHARACTER AND WELFARE OF THE WORKERS, INDUSTRIALLY AND SOCIALLY

1. The Feeling and Relationship between the Management and Men under Scientific Management.—In modification of the Taylor statements that "the men do not spend time in criticism of the management" and that "they are satisfied with the conditions of work and pay," Mr. Emerson admits that "no one is ever satisfied; no one ever holds his tongue." He prefers to say in this connection that scientific management "lessens the just criticism of the management" and that "the men are more satisfied with the conditions of work."[1]

2. The Feeling and Action under Scientific Management among the Workers in the Group or Shop.—Under this heading, Mr. Emerson objects first to the use of the word "eliminate" in the Taylor claims. Where Mr. Taylor asserts that scientific management "eliminates the irritation caused by the soldiering and poor work of individuals in the group"; "eliminates the ill feeling caused by parasitism and advancement and remuneration by favoritism"; "eliminates the irritation caused by rules which prevent the ambitious and efficient workers from doing their best and being paid accordingly," Mr. Emerson would say that scientific management "lessens" all these things.[1]

Secondly, in this connection, Mr. Emerson refuses altogether to subscribe to the Taylor statement that scientific management "eliminates the suspicion and ill feeling caused by the employment of pacemakers." Mr. Emerson believes in the employment of pacemakers and does not admit that under his system they are a cause of suspicion and ill feeling.[1]

3. The Effect of Scientific Management upon the Workers Intellectually.—Here Mr. Emerson agrees in general with the Taylor statement, but he would substitute for the phrase, "by its systematic transmission to the workers of industrial knowledge," the statement, "by its reciprocal exchange of experience and knowledge,"[1] and he would eliminate the phrase, "by rewarding the men for usable suggestions and improvements."[1]

---

[1] Interview, Nov. 18, 1914.

4. *The Relation of Scientific Management to Overspeeding and Exhaustion, Nervously and Physically.*—Mr. Emerson agrees in general with Mr. Taylor that scientific management "guards the workers against overspeeding and exhaustion." He rests this agreement, however, not upon the elimination of speeding under scientific management, but upon the general spirit under it and the proper placing of the workers. "The worker is stimulated because of the reciprocal exchange of knowledge,"[1] "The effort is to put men into work in which they can take joy."[1] "When a man is properly placed he goes with joy to his work; he likes it."[1] "It is hard to exhaust them if this is done."[1]

Under this general heading, Mr. Emerson would substitute the word, "work," for "task" and would modify the phrase, "by substituting exact knowledge for guesswork in the setting of the task," to read "in the placing of the men."[1]

7. *The Effect of Scientific Management upon the Skill, Efficiency and Productivity of the Workers.*—Here Mr. Emerson would modify the Taylor statement, "by the scientific selection of workmen so that each man is set to the highest task for which his physical and intellectual capacity fits him," to read "by the scientific selection of workmen so that each man is appointed to a position in which the work will give him pleasure, and for which he is physically, mentally, morally and temperamentally fitted."[1] He would substitute "by setting up standards of quantity and quality"[1] for the phrase, "by providing each worker with the best means and methods of work."[1] And in the phrase, "by educating and training the workers mechanically as they were never trained before,"[1] he would substitute "industrially" for "mechanically."[1]

9. *Scientific Management and the Hours of Labor.*—Mr. Emerson objects to the Taylor claim that scientific management tends to shorten the hours of labor. Hours should be shortened "for ethical reasons, not industrial reasons."[2] "If we try to shorten hours for industrial reasons we lose the strongest hold."[2] "Sixteen hours a day means more production than

---

[1] Interview, Nov. 18, 1914.

[2] Interview, Nov. 18, 1914, and formal statement submitted to Investigator.

eight."[2] "I believe," he says, "in the shorter working day not because more output is turned out in the shorter day, but because we want men, not machines, in the country."[2] However, Mr. Emerson thinks that too much is made of shortening the hours. "When there is joy in the work, the men ought to be able to work long periods."[2] "Under these circumstances, the shortening of the hours is a moral question."[2] In general, Mr. Emerson states that he does not care how long the men work. This statement does not mean that the working time is a matter of indifference to him, but he does not consider time as important as some other matters. "Ten minutes a day might be too much and 14 hours might be too little." "The employer has no right to ask a man to do more than a fair amount."[2] "If a man wishes to get this done by noon the employer has no right to ask him to work longer."[2]

12. Scientific Management and Rate Cutting.—The general declaration of the Taylor group is that wage rates once established are never cut. Mr. Taylor, himself, somewhat modifies this declaration. He says, "scientific management, through its general spirit and its systems of wage payment, prevents arbitrary rate cutting, and the placing of any arbitrary limit upon the amount which any worker may earn. Under scientific management, the rate is never cut without an absolute change in the directions governing the work, and the time demanded for doing it." Mr. Emerson lays much less stress upon this matter and makes no denial that under scientific management the rates may be altered after being once fixed, "in the interest of fairness."[1] "The essential thing in the relations between the men and the employers," he states, "is that the rate and the task should be fair; therefore, these should always be subject to change for the purpose of keeping them fair."[1] He is trying, he claims, "to give the men an incentive to work, and advises any man, if the rate is cut arbitrarily, to drop his efficiency."[1] "He is not alarmed over the possibility of cutting wages, for he is trying to raise wages all the time."[1] "What he does not want is for the efficiency to drop."[1] "The danger, under the Emerson system, is that the rate will be raised too rapidly. The real matter is not rate cutting. Too much is made of this."[1]

---

[1] Interview, Nov. 18, 1914.

[2] Interview, Nov. 18, 1914, and statement submitted to investigator.

But, says Mr. Emerson, "if a man wants to cut the rates, he will do it, scientific management or no scientific management. That is a moral question. Scientific management has nothing to do with this question."[1]

13. Scientific Management in Relation to the Earnings of the Workers.—Mr. Emerson agrees with Mr. Taylor, generally, as to the effect of scientific management upon earnings, but would modify the Taylor statement that scientific management "directly and immediately increases the wages of the worker in scientific management shops from 30 to 100%" to read, "all the way from a fraction to a goodly amount, varying from a slight increase to a 200% wage."[1]

Emerson calls attention to a vital difference between his system and those of Taylor and Gantt. Gantt requires that a man hit the bull's eye, or he gets no efficiency reward. Emerson gives a reward for hitting the target anywhere within the outer circle. A man under the Emerson system receives a premium for anything above 67% efficiency. The increase in wages under this system varies, therefore, from a small fraction to 200%. "The constant endeavor is to raise the efficiency of the shop as a whole and so the wages of all the men; to induce each individual to go up in the scale of efficiency and so to increase his own wages."[1] As to the reason for higher earnings and their limits under scientific management, Mr. Emerson says, "conditions surrounding the worker must be ameliorated and the worker will receive more per hour, not from any philanthropy but because there is no other way of lowering unit costs. The improvement in conditions and the increase of returns depend on lowering the unit cost. When unit costs can be no longer lowered in any direction, further improvement in conditions and pay will cease. The lowered unit cost not only provides the greater margin for the worker but widens the market and gives employment."[2]

Mr. Taylor makes no general statement of his wage theory in connection with his labor claims of scientific management.

[1] Interview, Nov. 18, 1914.

[2] Statement submitted to investigator.

He claims merely that scientific management remunerates each man according to his efficiency and seeks to raise wages while lowering labor cost, and to place both production and distribution upon a scientific and just basis. Elsewhere, indeed, he has indicated a belief in the justice of relative wage rates established by the unhampered operation of supply and demand.

Mr. Emerson approaches more nearly to a definite statement of a wage theory. "There are three points to be considered in wages. A man is entitled to the current day wage. This is the first thing to be settled. Second, determine the equivalent for this pay. This is the other half of the wage bargain. Third, individual superiority is the privilege of the worker, and should be rewarded accordingly. The method of paying wages by the day is outgrown and antiquated. Piece rates are to be deprecated. The men should be given day wages, but an increment or premium above this may be given for any number of reasons. An increment for special performance is only one of many cases."

"In this, scientific management and unionism are in accord, as illustrated by the union demand for an increment in payment for overtime."[1]

Mr. Emerson recommends, in practice, "subdividing the question into four parts:

1. The standard rate per hour (preferably for a definite number of hours per year).

2. A definitely specified standard equivalent in work for the wages paid: a fair hour's wage for a fair hour's work.

3. Classification according to value: $.20; $.30; $.40 or other higher and intermediate rates with promotion from one rate to another for many reasons, continued service being one of them.

4. A variable amount paid to the worker for his own special merit or performance in attaining a surpassing standard."[2]

"Service reward," he declares, "can mathematically and with almost God-like justice be apportioned to the four classes, worker, saver, society and leader."[3]

14. Scientific Management and the Displacement of Labor.—

---

[1] Interview, Nov. 18, 1914.

[2] *Efficiency and Modern Civilization,* section 338.

[3] Ibid., sect. 84.

Mr. Emerson admits that scientific management in common with other industrial improvements results in the displacement of labor. Moreover, "any sudden change of any kind that causes the laying off of many men is a great evil." "Such lay-offs are disasters of great magnitude to the workers, to society, to capital." However, "the application of scientific management is so excessively slow" that it causes relatively little displacement and such disasters it is scientific management's highest aim to eliminate. On the other hand, "the worker, per se, has no merit whatever. Temporarily, of course, there is obligation to meet emergencies but not to perpetuate hand grinding and hand weaving and hand spading and hand writing in order to furnish work to hand spinners and weavers, hand diggers and copyists. I do not regard the right to a job as 'inherent.'" "The state, however, does have obligations and very great ones towards this problem."[1]

15. Effect of Scientific Management upon the Employment of Labor in the Trades where it is Installed.—Mr. Emerson does not "stand for" the Taylor statement that scientific management "increases the employment of labor in the trades where it is installed by cheapening and thus increasing the demand for the product." "The moment," he says, "you begin to employ scientific management the thing gets away from you." "In . . . one shop systematized can make all the . . . needed in America." "It is but one of six or seven shops." "We are over-equipped in America." "Of course, if we could extend scientific management to bring in the government, the case might be different."[2]

20. Scientific Management, Collective Bargaining and Trade Unionism.—Mr. Taylor's general position was that scientific management reduces most matters with which it concerns itself to objective scientific fact. Where this is true, bargaining and collective bargaining are impossible. You can no more bargain about the facts established by scientific management, he declared, than you can about the rising and the setting of the sun. Moreover, scientific management has established a great code of laws which completely controls the acts of the management and the workmen. On this account, and also because of its general spirit, scientific management makes collective bargaining and trade unionism unnecessary as protection to the workers.

---

[1] *Efficiency and Modern Civilization*, sect. 280, 281, 278, 275; and statement to investigator.

[2] Interview, Nov. 18, 1914.

Mr. Emerson seems here to be in broad general agreement with Mr. Taylor but is somewhat more conservative in his claims. He says that as to payment, scientific management makes collective bargaining unnecessary as a protection to the workers, but he makes no direct claim in regard to the determination through scientific management of exact scientific knowledge or to the establishment of a code of natural laws equally binding upon employers and workers. In fact, he repudiates the idea that there is anything about scientific management that can prevent an employer so minded from dealing unjustly with the workers and, therefore, does not make the direct statement that scientific management makes trade unionism unnecessary as a protection to the workers. He admits, however, that there cannot be any collective bargaining in scientific management, basing the statement upon the broad general ground that "collective bargaining as to scientific facts is impossible.[1] It is a question of the laws of the universe. For example, in the rolling of glass, it has been found by tests that the glass cools 500 degrees, after being taken from the furnace, in a short space of time that cannot be recorded by the stop-watch. After that time, it cools much less rapidly. The glass must be worked at the precise moment when it is at a proper heat. I cannot bargain about such matters."[1]

However, it is to be noted that Mr. Emerson has not always been consistent in regard to this matter. Testifying before the U.S.C.I.R., when asked the question, "Is there anything in the system which you advocate that is not in any wise reconcilable with a full practice of collective bargaining from your standpoint?" Mr. Emerson replied: "No; I know of nothing that would make it antagonistic to collective bargaining."[2]

25. Scientific Management and the Causes of Social Unrest. —Mr. Emerson does not subscribe to the Taylor statement that scientific management tends to remove the causes of social unrest. In this connection, he says, "scientific management is a mere tool. It does not touch the fundamental question at all."[1]

---

[1] Interview, Nov. 18, 1914.

[2] Testimony, United States Commission on Industrial Relations, p. 1447.

C. Labor Claims of Scientific Managers Touching Certain Specific Features and Methods of Scientific Management

1. The General Character and Effect of Time and Motion Study.—Mr. Emerson subscribes to the general statement that time and motion study is necessary to secure justice to the workers and improvement in the wages and conditions of employment. He has not claimed with Mr. Taylor, however, "that time and motion study is the accurate scientific method by which the great mass of laws governing the best and easiest and most productive movements of men are investigated," or that "these laws constitute a great code, which, for the first time in industry, completely controls the acts of the management as well as those of the workmen."[1]

1. a. (1) (a.) *The Adaptation of the Task to the Worker through Time and Motion Study.*—Mr. Emerson agrees, in general, with the statement that time and motion study makes possible and is necessary to the adaptation of the task to the intellectual and physical capacity of the worker. He would, however, substitute here the word, "work," for "task."[1]

1. a. (1) (e). *The Elimination of Soldiering through Time and Motion Study.*—Mr. Emerson characterizes as unimportant the Taylor statement that time and motion study makes possible and is necessary to the elimination of systematic soldiering.[1]

1. a. (3) (b). *Time and Motion Study in Relation to Speeding-up and the Arbitrary Alteration of the Task.*—Mr. Emerson would strike out the statement that time and motion study eliminates the chief causes of speeding-up, and the arbitrary alteration of the task. As indicated above, he admits that scientific management is a speeding-up system, and that the task should always be subject to change for the purpose of keeping it fair.[1]

1. a. (3) (c). *Time and Motion Study in Relation to Rate Cutting.*—Mr. Taylor asserts that time and motion study eliminates the chief causes of rate cutting. Mr. Emerson refuses to subscribe to this statement. "This," he says, "is a moral question. Scientific management has nothing to do with it."[1]

---

[1] Interview, Nov. 18, 1914.

1. b. The Attitude of the Worker towards Time and Motion Study and the Use of the Stop-Watch.—Mr. Emerson characterizes as "not true" the Taylor claim that time and motion study, with the use of the stop-watch, is not objected to by the workers when its purposes are properly explained and understood by the workers and when used openly and above board by men whose knowledge and ability the workers respect.

"Some men," he says, "will object to the stop-watch under any circumstances."[1] "Others make no objections."[1] He has never had any trouble here, but he objects to this generalization.

2. a. Task Setting under Scientific Management and its Effects.—Mr. Emerson subscribes, in general, to the results claimed by Mr. Taylor for task setting and the modes of payment employed by scientific management. He objects, however, to task setting, itself. He prefers to ascribe the results claimed to planning, scheduling and dispatching. In this connection, he again objects strenuously to the "task." "The task," he declares, "carries with it the idea of distaste."[1] "A man cannot do good work when it is repugnant."[1] Therefore, he hates the word "task."[1]

2. b. The Modes of Payment Employed by Scientific Management and Their Results.—Mr. Emerson subscribes to the Taylor claims as to the effects of the modes of payment employed by scientific management. However, he characterizes these claims as "relatively unimportant."[1] In this connection, Mr. Emerson takes occasion to express himself as unqualifiedly opposed to piece rates. He "loathes"[1] piece rates, and considers them "the greatest obstacle to the introduction of scientific management."[1] "I object to the piece rate method of payment," he declares, "because it is unscientific."[1] "Because it places human work in the same classification as material, something to be measured not by time but by volume, therefore, inciting to excess and overstrain; because it puts the responsibility for results on the worker, although the greater part of this responsibility rests with the management; because it makes no allowance for any other factor than output, so the child, girl or boy, so the man, good or bad, healthy or unhealthy, intelligent or unintelligent, is paid the same if equally strenuous; because it is often the manager's immediate interest to cut piece rates and the workers' own protection to limit output, because I have seen rates repeatedly cut until the good workers were driven out of the shop and the poor incompetent who remained had to start at 4 a. m. in order to earn a fair day's pay; because of these and many other injustices, I condemn the non-observance of principles, which, if they had been followed, would never have sanctioned this method of pay."[1] "Therefore," says Mr. Emerson, "piece rates make his hair rise."[1]

---

[1] Interview, Nov. 18, 1914.

In the regulation of rates, Mr. Emerson, himself, emphasizes the psychological side of the problem. He has found it "undesirable to pay a different bonus for different kinds of work as Taylor does."[1] He "gets the same results by varying the standard time."[1] He finds that "men have a secret objection to variation in rates but not so much to variation in time."[1] "The ordinary man never wants to beat the rate but usually takes interest in beating the time."[1]

---

[1] Interview, Nov. 18, 1914, and *Efficiency in Modern Organization*, section 293.

APPENDIX V

THE TRADE UNION OBJECTIONS TO SCIENTIFIC MANAGEMENT

A. Trade Union Objections Directed Against the Alleged General Character and Spirit of "Scientific Management."

Organized labor understands by the term, "scientific management," certain well-defined "efficiency systems" which have been recently devised by individuals and small groups under the leadership or in imitation of men like Frederick W. Taylor, H. L. Gantt, and Harrington Emerson, by whom this term has been preëmpted. Organized labor makes a clear distinction between "scientific management" thus defined and "science in management." It does not oppose savings of waste and increase of output resulting from improved machinery and truly efficient management. It stands, therefore, definitely committed to "science in management," and its objections are directed solely against systems devised by the so-called "scientific management" cult. Against "scientific management," thus defined, the trade unions charge that:

1. "Scientific management" is a device employed for the purpose of increasing production and profits; and tends to eliminate consideration for the character, rights and welfare of the employees.
   - *a.* It libels the character of the workmen.
   - *b.* It looks upon the worker as a mere instrument of production.
   - *c.* It ordinarily allows the workmen no voice in hiring or discharge, the setting of the task, the determination of the wage rate, or of the general conditions of employment.
   - *d.* In spirit and essence, so far as labor is concerned, it is a cunningly devised speeding-up and sweating system.

  e. It is based on the principle of the survival of the fittest.

2. "Scientific management" is opposed to industrial democracy; it is a reversion to industrial autocracy. It forces the workers to depend upon the employers' conception of fairness, and limits the democratic safeguards of the workers.
3. "Scientific management," in its relations to labor, is unscientific.
    - *a.* It violates the fundamental principles of human nature by ignoring temperament and habits.
    - *b.* It concerns itself almost wholly with the problem of production, disregarding, in general, the vital problem of distribution.
    - c. It is unscientific in its determination of the task and the wage rate.
    - *d.* It does not take all of the elements into consideration, but deals with human beings as it does with inanimate machines.
4. "Scientific management" could be scientific and, at the same time, be inimical to the welfare of the workers.
5. "Scientific management" does not tend to develop general and long-time economic efficiency.
6. "Scientific management" tends to emphasize quantity of product at the expense of quality.
7. "Scientific management" is incapable of extensive application.
8. "Scientific management" is a theoretical conception already proven a failure in practice.

B. Trade Union Objections Directed Against the Effects of "Scientific Management" Upon the Conditions of Work and the Character and Welfare of the Workers and Society.

The trade unions charge that:

1. "Scientific management" greatly increases the number of "unproductive workers," that is, those engaged in clerical or supervisory work.
2. "Scientific management" tends to gather up and transfer to the management all the traditional knowledge, the

judgment and the skill, and monopolizes the initiative of the worker in connection with the work.

3. "Scientific management" intensifies the modern tendency toward extreme specialization of the work and the task.
    a. It splits up the work into a series of minute tasks.
    b. It tends to confine the worker to the continuous performance of one of these tasks.
4. "Scientific management" displaces day work and day wages by task work and the piece rate, premium and bonus systems of payment.
5. "Scientific management" is arbitrary in the setting of the task.
    a. It tends to set the task on the basis of "stunt" records of the strongest and swiftest workers without due allowance for the human element or unavoidable delays.
    b. It holds that if the task can be performed it is not too great.
    c. It shows a constant tendency to increase the intensity and extent of the task.
6. "Scientific management" forces individuals to become "rushers" and "speeders."
7. "Scientific management" tends to displace all but the fastest workers.
8. "Scientific management" greatly intensifies unnecessary managerial dictation and discipline.
9. "Scientific management" has refused to deal with the workers except as individuals.
10. "Scientific management" tends to disregard the physical welfare of the workers.
11. "Scientific management" through these attributes and methods:
    (1) Tends to deprive the worker of thought, initiative, sense of achievement and joy in his work.
    (2) Tends to eliminate skilled crafts.
    (3) Is destructive of mechanical education and skill.
    (4) Tends to deprive the worker of the possibility of learning a trade.
    (5) Puts a premium on muscle and speed rather than on brain.

(6) Condemns the worker to a monotonous routine.
(7) Dwarfs and represses the worker intellectually.
(8) Tends to destroy the individuality and inventive genius of the workers.
(9) Stimulates and drives the workers up to the limit of nervous and physical exhaustion, and overfatigues and overstrains them.
(10) Tends to undermine the workers' health.
(11) Shortens the workers' period of industrial activity and earning power.
(12) Increases the danger of industrial accidents.
(13) Tends to destroy the workers' self-respect and self-restraint, and leads to habits of spending and intemperance.
(14) Tends to increase the number of punishable shop offenses, and the amount of docking of wages and fining.
(15) Tends to prevent the presentation, and denies the consideration, of grievances.
(16) Constitutes a species of industrial "third degree."
(17) Creates the possibility of systematic blacklisting.
(18) Destroys the independence and manhood of the workers.
(19) Tends to reduce the workers to complete dependence upon the employers—to the condition of industrial serfs.
(20) Introduces the spirit of mutual suspicion and contest among the men, and thus destroys the solidarity and coöperative spirit of the group.
(21) Strikes at the root of workshop ethics.
(22) Is incompatible with and destructive of collective bargaining.
(23) Destroys all the protective rules and standards established by unionism.
(24) Discriminates against union men.
(25) Is incompatible with and destructive of trade unionism.
(26) Displaces the skilled workers and forces them into competition with the less skilled through specialization of the task and destruction of craft skill.

(27) Narrows the competitive field and weakens the bargaining strength of the workers.

(28) Establishes a rigid standard of wages regardless of the progressive increase in the cost of living.

(29) Puts a limit upon the amount of wages which any man can earn.

(30) Often squeezes out of the workers vast overhead charges.

(31) Offers no guarantee against rate cutting.

(32) Is itself a systematic rate-cutting device.

(33) Tends to lower the wages of many immediately and permanently.

(34) Violates and indefinitely postpones the application of the fundamental principle of justice to distribution.

(35) Means, in the long run, simply more work for the same or less pay.

(36) Tends to lengthen the hours of labor.

(37) Shortens the tenure of service and lessens the certainty and continuity of employment.

(38) Leads to overproduction and increase of unemployment:

a. In the particular group.

b. In general.

(39) Fails to satisfy the workers under it, but on the contrary, is regarded by them with extreme distaste.

(40) Increases the antagonism between the workers and their employers.

(41) Intensifies the conditions of industrial unrest.

(42) Offers no guarantee against industrial warfare, and is conducive to strikes.

12. Finally, "scientific management" puts into the hands of employers at large an immense mass of information and methods which may be used unscrupulously to the detriment of the workers, and offers no guarantee against the abuse of its professed principles and practices.

C. *Trade Union Objections to Specific Features of "Scientific Management" Are Leveled Mainly Against Time Study and Motion Study, Task Work and the Piece-Rate, Premium and Bonus Systems of Payment Employed by the Efficiency Experts.*

In this connection, they charge that:

1. Time study and motion study are a direct attack upon the rights, dignity and welfare of the workers, are destructive of skill and true efficiency, and are a menace to industrial peace.
    - *a.* They are unfair in method.
    - *b.* They are an evidence of suspicion and a direct question of the honesty and fairness of the workers.
    - *c.* They indicate a purpose on the part of the scientific managers and employers to extract the last ounce of energy out of the workers.
    - *d.* They ignore habits and traditions of work, and tend to minimize the acquired skill of the workers.
    - *e.* They split the work up into minute tasks, discover the utmost which the most efficient worker can do as a "stunt" record, and enable the employer to substitute piece work where before day work prevailed, and to substitute various premium and bonus systems for the day wage and thus:
        - (1) Increase the modern tendency toward specialization.
        - (2) Destroy the skilled crafts.
        - (3) Deprive the worker of training.
        - (4) Reduce his work to a monotonous routine.
        - (5) Repress his thought and intelligence.
        - (6) Reduce him to a semi-automatic attachment to the machine or tool.
        - (7) Tend to destroy his initiative, ambition and inventive genius.
        - (8) Encourage the piece work system.
        - (9) Encourage the use of various premium and bonus systems.
        - (10) Enable the employer to deal with the work-

ers as individuals, and thus to substitute individual for collective bargaining.

(11) To pit workman against workman.

(12) To introduce rushers and speeders.

(13) To destroy the basis of workshop ethics.

(14) To destroy unionism, and its protective rules and standards.

(15) To speed the worker up beyond the point of physiological and mechanical safety.

(16) To displace the skilled workers and force them into competition with the less skilled.

(17) They thus lower wages and increase unemployment.

(18) They tend to reduce the quality of the work and output.

(19) They tend to destroy the health, and lessen the length of the productive period of the workers.

(20) They increase the drastic character of the discipline.

(21) They increase the possibilities of blacklisting.

(22) They furnish no just or scientific basis for calculating the wage rate.

(23) They increase the points of friction and are thus productive of industrial warfare.

f. Time and motion study are not necessary to secure true efficiency, as all the data necessary for planning, routing, cost accounting, task setting, and true efficiency in work can be secured without resort to elementary time study and motion analysis and the use of the stop-watch.

2. The methods of work and remuneration employed by "scientific management," its basic wage, its task work, piece rate, premium and bonus system, are unscientific and unjust in principle; are, in practice, inimical to the welfare of the workers, and are productive of social unrest and industrial warfare.

a. The basic wage of "scientific management" is simply the customary wage of the region for the class of labor employed. It has absolutely no foundation in science or justice, but is the outcome of the relative competitive strength of workers and employers, and is often estimated at the bare subsistence level or even below.

b. In accepting this wage as the basis of its "scientific" and just methods of remuneration, "scientific management" conveys the impression that it, the base wage, also is scientific and just, and tends thus to make it permanent at its present level—to fix general wages at the present rates.

c. The premium and bonus rates which "scientific management" imposes upon this basic wage are both unscientific and unjust to the workers employed.

   (1) They are determined not upon what the worker actually produces, and an attempt to approximate this, but upon a study of how little the worker must be given to insure his utmost effort, and upon how much the employer must be given of the worker's extra product to buy him off from rate cutting.

   (2) They usually result in giving the worker less than the regular rate of pay for his extra exertion, and only a portion, and usually the smaller portion, of the product which his extra exertion has created. They are usually less advantageous to the worker than straight piece work.

   (3) The premiums and bonuses are usually arranged so that it is greatly to the advantage of the employers to prevent the workers from equaling or exceeding the task, and securing extra payment therefor.

   (4) Therefore, the task is usually set so high that only a few of the strongest and most agile workers are capable of accomplishing it, and securing any bonus or premium.

   (5) There is a constant tendency to raise the task.

   (6) In the most advanced systems, there is a punishment by means of the lowering of regular rates, and the consequent loss of wage

for the workers who fail to make the task thus set, as in the case of differential piece rates.

d. The methods of payment employed by "scientific management," therefore:
  (1) Offer no guarantee against rate cutting, but, on the contrary, induce to systematic cutting of the rates.
  (2) Result usually in no gain over the customary wage for the most of the workers in the "scientific management" shops, and sometimes in an actual lowering of the wage below the customary rate.
  (3) Result in the degradation of skilled to the condition of less skilled men.

e. The modes of payment employed by "scientific management":
  (1) Open the way for the employment of rushers and speeders.
  (2) Introduce the contest principle among the workers.
  (3) Displace harmony and coöperation among the working group by mutual suspicion and controversy.
  (4) Make collective bargaining practically impossible.
  (5) Prevent the enforcement of the protective standards and rules of unionism.
  (6) Destroy the union spirit and organization.
  (7) Induce and compel overspeeding and overexertion.
  (8) Tend to undermine the health of the workers and bring on premature old age.
  (9) Increase the dangers of industrial accidents.
  (10) Jeopardize the quality of the product.
  (11) Lead to overproduction and unemployment.
  (12) Lead to a general lowering of wages and the standards of living among the workers.

f. The modes of payment employed by "scientific management" are not necessary to true efficiency.

APPENDIX VI

VITAL POINTS AT ISSUE BETWEEN SCIENTIFIC MANAGEMENT AND LABOR BASED UPON THE LABOR CLAIMS OF SCIENTIFIC MANAGERS

1. Does scientific management assign to each worker a definite and accomplishable task?
2. Does scientific management substitute exact knowledge for guesswork in the setting of the task?
3. Does scientific management set the task on the basis of careful studies of fatigue?
4. Does scientific management set the task on the basis of scientific, physiological and psychological studies of the individual workers concerned?
5. Does scientific management in the setting of the task base the allowance for the human element on careful psychological studies?
6. Does scientific management set the task on the basis of a large number of performances by men of different capacities?
7. Does scientific management set the task with reference to the long-time capacity of the workers and long-time results?
8. Does scientific management in setting the task thus make due and scientific allowance for the human factor?
9. Does scientific management in setting the task make due and scientific allowance for unavoidable breakdowns and legitimate delays?
10. Are elementary time study and motion study necessary to the setting of the task with due and scientific allowance for the human factor, unavoidable breakdowns and legitimate delays?
11. Does scientific management systematically attempt to as-

sign the workmen to tasks to which they are especially adapted?

12. Does scientific management substitute exact knowledge for guesswork in the assignment of the character of the task?
13. Does scientific management actually and systematically determine the character of the task to which each workman is set by means of scientific, physiological and psychological studies of the worker?
14. Does scientific management thus make possible the scientific selection of the workmen, i.e., the mutual adaptation of the task and the worker?
15. Is scientific management thus a practical system of vocational guidance and training?
16. Are elementary time study and motion study necessary for the scientific adaptation of the task and the worker?
17. Does scientific management require each worker to learn and to perform not one but several tasks, wherever possible?
18. Does scientific management make economically possible the systematic routing of the workers through the shop?
19. Does scientific management thus mitigate the evil effects upon the workers of the modern tendency toward specialization caused by machine production?
20. Are time and motion study necessary for the proper routing of the workers in the shop, as well as of the jobs and materials?
21. Does scientific management eliminate pacesetters?
22. Does scientific management turn speeders into instructors?
23. Are the modes of payment employed by scientific management necessary for the elimination of the need for pacesetters and the turning of speeders into instructors?
24. Does scientific management eliminate systematic soldiering?
25. Are time and motion study and the modes of payment employed by scientific management necessary to the elimination of systematic soldiering?
26. Is the speed of the men under scientific management set

with reference to long-time effects upon the workers and long-time productive results?

27. Does scientific management institute rational rest periods and modes of recreation during the working hours?
28. Is it true that the so-called speeding-up of scientific management is mainly a speeding-up of machinery which involves no extra exertion on the part of the workers?
29. Are any overstrained or overworked employees to be found in scientific management shops?
30. Do time and motion study eliminate the chief causes of speeding-up?
31. Does scientific management thus guard the workers against overspeeding and exhaustion nervously and physically?
32. Does scientific management train the workers in the most economical and easiest methods of performing operations?
33. Are time and motion study necessary to the determination of the most efficient methods of performing the work?
34. Do time and motion study and scientific task setting promote the training of the workmen?
35. Do the modes of payment employed by scientific management turn foremen into instructors?
36. Does scientific management instruct and train workers by means of a corps of competent specialists?
37. Does scientific management bring all the workers into close, systematic and helpful touch with the management?
38. Does scientific management thus systematically transmit to the workers all the traditional craft knowledge and skill which is being lost and destroyed under current industrial methods?
39. Does scientific management eliminate avoidable breakdowns and delays?
40. Does scientific management furnish each workman with the best tools and materials at the proper time and place?
41. Are time and motion study necessary in order to furnish each workman with the tools and materials at the proper time and place?

42. Does scientific management standardize equipment and performance?
43. Does scientific management remove from the worker responsibility for determining the best methods of work?
44. Does scientific management remove from the worker the responsibility for the work of others?
45. Does scientific management remove from the worker responsibility for the instruction of beginners and helpers?
46. Does scientific management reward the men for helpful suggestions and improvements in methods of work?
47. Does scientific management substitute the rule of natural law for arbitrary decisions of foremen and employers in matters of shop discipline and other conditions of employment?
48. Does scientific management thus eliminate favoritism in the shop?
49. Does scientific management eliminate the arbitrary bullying of foremen?
50. Does scientific management thus lessen the rigors of shop discipline?
51. Does scientific management thus give to the workers an equal voice with the employers in shop discipline?
52. Does scientific management thus give a voice to the workers in matters of hiring and discharge, the setting of the task, the determination of the wage rate, and the general conditions of employment?
53. Does scientific management give to the workers an equal voice with the employers in these matters?
54. Does scientific management thus democratize industry?
55. Does scientific management treat each worker as an independent personality?
56. Does scientific management pay men rather than positions, and reward each workman in exact proportion to his efficiency?
57. Are elementary time and motion study necessary in order that each worker should be rewarded in exact proportion to his efficiency?
58. Are the modes of payment employed by scientific management necessary in order that each worker should be rewarded in exact proportion to his efficiency?

59. Does scientific management provide immediate rewards for increased efficiency or improved output?
60. Does scientific management, by all these means and methods:
    - *a.* Stimulate the thought and ambition of the workers?
    - *b.* Mitigate the monotony incident to modern machine industry?
    - *c.* Develop the sense of personal achievement of the worker?
    - *d.* Put interest, joy and zest into the work?
    - *e.* Stimulate the workers' inventive genius?
    - *f.* Energize the workers intellectually?
    - *g.* Promote the workers' self-reliance, self-respect, individuality, personality, and dignity?
    - *h.* Develop and broaden the mechanical skill of the workers?
    - *i.* Train the workers mechanically as they were never trained before?
    - *j.* Tend to induce in the workers habits of industry, temperance and saving, and elevate them morally and socially?
    - *k.* Eliminate the suspicions of the employers that the men are soldiering or gaining an unfair advantage?
    - *l.* Promote a friendly feeling between the management and the men?
    - *m.* Prevent suspicions and complaints of the management by the men?
    - *n.* Eliminate suspicion of the management by the men?
    - *o.* Cause the workers to regard their employers as their best friends?
    - *p.* Make the men in the shop more manly, truthful, and straightforward?
    - *q.* Eliminate the hampering of the strong and willing by the weak and unwilling?
    - *r.* Prevent the more efficient workers from being held back and demoralized by the inefficient?
    - *s.* Promote friendly feeling and action among the workers of the shop group? Make the workers under scientific management more cheerful and helpful than under the old form of management?

  t. Set each man to the highest task for which his physical and intellectual capacity fits him?
  u. Open the way for all workmen to become "first-class men" in some employment?
  v. Insure just treatment of the individual worker?

61. Does scientific management thus increase efficiency and productivity of the workers?
62. Are the time and motion study and the modes of payment employed by scientific management necessary to the increase of efficiency and output?
63. Does scientific management make possible the increase of efficiency and output with less effort on the part of the workers?
64. Does scientific management purchase labor by specification, and thus tend to insure justice to both parties?
65. Does scientific management substitute exact knowledge for guesswork in the payment of wages—pay a wage which is exactly equivalent to the workers' efficiency or worth?
66. Are time and motion study necessary in order to substitute exact knowledge for guesswork in wage payment?
67. Does scientific management raise the wages of workers in scientific management shops?
68. Does scientific management raise the wages of both the skilled and unskilled workers?
69. Does scientific management tend to raise wages generally?
70. Does scientific management lower the labor cost while raising wages?
71. Does scientific management prevent the placing of any arbitrary limit upon the amount which any worker may earn?
72. Are time and motion study necessary for exact cost prediction?
73. Do time and motion study tend to eliminate ignorant bidding?
74. Do time and motion study, therefore, eliminate the chief causes of the arbitrary alteration of the task, and arbitrary rate cutting?

75. Do the modes of payment employed by scientific management tend to guarantee against rate cutting?

76. Is it true that under scientific management the rate is never cut without an absolute change in the directions governing the work and the time demanded for doing it?

77. Does scientific management, therefore, prevent arbitrary rate cutting?

78. Does scientific management substitute exact knowledge for guesswork in the determination of the hours of work?

79. Does scientific management tend to shorten the hours of work?

80. Does scientific management surround the workers with the safest and most sanitary shop environment?

81. Does scientific management improve the workers' health?

82. Does scientific management raise the old age limit of the workers, lengthen the lives and earning capacity of the workers?

83. Does scientific management tend to eliminate split shifts or the "on-and-off" system of work?

84. Does scientific management lessen the number of part-time workers?

85. Does scientific management lessen the necessity of a shop reserve of workers?

86. Does scientific management increase the security of employment of the individual worker?

87. Does scientific management increase the continuity of employment of the individual worker?

88. Does scientific management broaden the field of industrial activity and competition of the individual worker?

89. Does scientific management open up to all workers extensive opportunities for promotion and advancement?

90. Does scientific management tend to prevent the displacement and degradation of skilled workers?

91. Does scientific management make collective bargaining unnecessary as a protection to the workers?

92. Does scientific management make trade unions and trade union regulations unnecessary as a protection to the workers?

93. Does scientific management, however, welcome the cooperation of unionism and unionists? If so, how?
94. Is it true that time and motion study, with the use of the stop-watch, is not objected to by the workers when its features are properly explained and understood by the workers, and when it is used openly and aboveboard by men whose knowledge and ability the workers respect?
95. Are time and motion study under scientific management generally so explained and used?
96. Does scientific management tend to prevent strikes and industrial warfare?
97. Does scientific management tend to increase the employment of labor in the trades and industries where it is installed?
98. Does scientific management tend to lessen thus the danger of unemployment?
99. Does scientific management make possible a more accurate adjustment of supply and demand, and so tend to eliminate overproduction, unemployment, crises and depression?
100. Does scientific management set the task with due reference to the relation between quantity and quality?
101. Does scientific management improve the quality of the product?
102. Are the workers under scientific management satisfied with the conditions of work and pay?
103. Does scientific management tend to eliminate the causes of social unrest?
104. Is scientific management capable of wide-spread application?
105. To what extent are the systems of fact and law, upon which scientific management is supposed to be based, actually worked out and put into actual practice?
106. Is scientific management a system devised by industrial engineers rather than by employers?
107. Is scientific management really based upon a belief in harmony of interests between employers and workers?
108. Is scientific management, in practice, used to subserve the common interests of employers, workmen, and so-

ciety at large, for the elimination of avoidable wastes, the general improvement of the processes and methods of production, and the just and scientific distribution of the product?

APPENDIX VII

VITAL POINTS AT ISSUE BETWEEN SCIENTIFIC MANAGEMENT AND LABOR BASED UPON THE TRADE UNION OBJECTIONS TO SCIENTIFIC MANAGEMENT

1. Does scientific management split up the work, whenever possible, into a series of minute tasks?
2. Does scientific management tend to confine each worker to the continuous performance of one particular task?
3. Does scientific management thus tend to intensify or exaggerate the modern tendency toward extreme specialization of the work and the task?
4. Does scientific management thus tend to eliminate skilled crafts?
5. Does scientific management thus enable the employer to substitute piece work where day work before prevailed?
6. Does scientific management displace day work by piece work, where before day work prevailed?
7. Does scientific management systematically attempt to substitute piece work, premium and bonus systems of payment in place of the day wage?
8. Are time and motion study, as employed by scientific management, arbitrary and unfair in method?
9. Do time and motion study, as employed by scientific management, indicate a purpose to extract the last ounce of energy from the workers?
10. Is scientific management arbitrary in the setting of the task; does it allow the workers any voice in the setting of the task?
11. Does scientific management determine the task by means of "stunt" records of the strongest and swiftest workers?
12. Does scientific management, in its determination of the task by means of time and motion study, make any just

or scientific allowance for the human factor or unavoidable breakdowns and delays?

13. Does scientific management consistently increase the extent and severity of the task?

14. Does scientific management hold that if the task can be performed it is not too great?

15. Does scientific management tend to increase the number of punishable shop offenses which may be committed by the workmen?

16. Does scientific management tend to increase the amount of "docking" and "fining"?

17. Does scientific management otherwise greatly intensify unnecessary managerial dictation and the severity of the discipline; is it a species of industrial "third degree"?

18. Does scientific management force individuals to become "rushers" and "speeders"?

19. Does scientific management tend to deprive the worker of all opportunity for rest, recreation and sociability during the time of work?

20. Is scientific management, so far as the workers are concerned, a speeding-up system; does it, by its methods, stimulate and drive the workers up to and beyond the point of nervous and physical endurance and exhaustion?

21. Are time and motion study, as employed by scientific management, evidence of unjust suspicion of the honesty and fairness of the workers?

22. Are time and motion study, as employed by scientific management, a direct attack upon the honesty, fairness and dignity of the workers?

23. Does scientific management libel the character of the workmen?

24. Does scientific management tend to gather up and transfer to the management all the traditional knowledge and judgment, and monopolize the initiative of the workers in connection with the work?

25. Does scientific management force the workers to follow strictly minute instructions in the performance of the task?

26. Does scientific management look upon the worker, and treat him as a mere instrument of production?
27. Does scientific management deal with human beings as it does with inanimate machines?
28. Does scientific management, by all these methods:
    a. Enable the unskilled and underpaid to compete with the skilled?
    b. Put a premium on muscle and speed rather than on brain?
    c. Tend to deprive the worker of thought, judgment, initiative in connection with his work?
    d. Tend to minimize the acquired skill of the workers?
    e. Tend to destroy the craftsmanship and craft skill of the worker?
    f. Tend to deprive the workers of the opportunity of learning a trade?
    g. Deprive the worker of industrial and mechanical training?
    h. Reduce the worker to a semi-automatic attachment to the machine or tool?
    i. Narrow the scope, and increase the monotony of work, and practically condemn the worker to a fixed monotonous routine?
    j. Decrease the general and long-time efficiency of the workers?
        (1) Those retained
        (2) Those discharged
    k. Narrow the industrial capacity of the worker?
    l. Narrow the workers' field of industrial and competitive activity?
    m. Deprive the workers of the hope of future advancement?
    n. Tend to destroy the individuality of the worker?
    o. Tend to destroy the initiative of the worker?
    p. Destroy the sense of achievement of the worker?
    q. Destroy the worker's joy and pride in his work?
    r. Tend to destroy the independence of the worker?
    s. Tend to destroy the dignity and manhood of the worker?
    t. Tend to destroy the ambition of the worker?

u. Tend to suppress and destroy the inventive genius of the worker?

v. Overstrain and fatigue the workers nervously and physically?

w. Repress and dwarf the workers intellectually?

x. Tend to undermine the worker's health and bring upon the worker premature old age?

y. Increase the danger of industrial accidents?

29. Is scientific management destructive of mechanical education and skill?

30. Does scientific management thus tend to induce in the worker habits of loafing, dissipation and spending?

31. Does scientific management tend to shorten the period of industrial activity and earning power of the workers?

32. Does scientific management introduce the contest principle among the workers and pit man against man?

33. Does scientific management displace all but the fastest workers?

34. Does scientific management displace the spirit of mutuality and harmony in the working group by mutual suspicion and distrust?

35. Does scientific management thus destroy the basis of workshop ethics?

36. Does scientific management refuse to deal with the workers' representatives?

37. Does scientific management refuse to deal with representatives of the workers who are not in its employ?

38. Does scientific management refuse to deal with union officials?

39. Does scientific management refuse to deal with the men except as individuals?

40. Does scientific management tend to prevent the presentation and deny the consideration of grievances?

41. Does scientific management, ordinarily, refuse to allow the workers any voice in hiring, discharge, setting of the task and other conditions of work, or in determining the wage rate or the modes and conditions of payment? Is scientific management, as alleged, arbitrary in these matters?

42. Does scientific management force the workers to depend

upon the employers' conception of fairness in all these matters?

43. Is scientific management thus:
    - *a.* Inimical to collective bargaining?
    - *b.* Does it tend to destroy collective bargaining?
    - *c.* Is it incompatible with collective bargaining?

44. Does scientific management destroy or make impossible of enforcement all the protective standards and rules which have been established by trade unionism?

45. Does scientific management discriminate against unionism?

46. Is scientific management thus:
    - *a.* Opposed to trade unionism?
    - *b.* Inimical to trade unionism? In spirit and theory? In practice?
    - *c.* Does it tend to destroy trade unionism?
    - *d.* Is it incompatible with trade unionism?

47. Where unions exist, do they make the practice of efficiency and scientific management impossible?

48. Are the premium, bonus and differential piece rates of scientific management based upon a study of how little the worker must be given to purchase his utmost effort, and upon how much the employer must be given of the worker's extra product to buy him off from rate cutting?

49. Are the premium, bonus and differential piece rates of scientific management usually less advantageous to the worker than straight piece rates?

50. Are the premium, bonus and differential piece rates of scientific management usually so calculated as to give the worker less than the regular rate of pay for his extra exertion and output above the established standard task?

51. Are the premium, bonus and differential piece rates of scientific management usually so calculated as to give the worker only a portion, and usually the lesser portion, of the product that his extra exertion has created, above the standard task?

52. Are the premium, bonus and differential piece rates usually so calculated under scientific management as

to make it greatly to the advantage of the employer to prevent the mass of the workers from equaling or exceeding the task, i.e., to keep the task just beyond the reach of the majority of the workers?

53. Under scientific management, is the task usually set so high that only a few of the strongest and most capable can accomplish it?
54. Do the great majority of the workers, under scientific management, actually fail to make the task, and secure the bonuses and premiums, or higher differential piece rates?
55. Are the workers under scientific management who fail to make the task usually severely punished by docking, demotion or discharge?
56. Are the foremen under scientific management usually paid according to the number of men or machines which make the tasks?
57. Is scientific management, then, in spirit and essence, a sweating system?
58. Does scientific management greatly increase the number of unproductive workers?
59. Does scientific management often squeeze out of the workers vast overhead charges?
60. Does scientific management lower the wages of the workers in scientific management shops, as compared with the customary wages?
    - *a.* The few.
    - *b.* The many.
61. Does scientific management offer any guarantee against rate cutting?
62. Does scientific management place a limit upon the earning power of the men?
63. Is scientific management, itself, a systematic rate-cutting device?
64. Does scientific management cut the wages of those who fail to make the task below the customary wage standard?
65. Does scientific management tend to establish a rigid standard of wages regardless of the progressive increase in the cost of living?

66. Does scientific management tend to fix the present customary wage permanently at its existing level?
67. Does scientific management tend to lengthen the hours of labor?
68. Does scientific management, if successful, tend to create overproduction
    a. In the group or trade?
    b. In general?
69. Does scientific management tend to increase the number of part-time workers?
70. Does scientific management, if successful, tend to create unemployment?
    a. In the group or trade?
    b. In general?
71. Does scientific management displace the skilled workers and force them into competition with the less skilled?
72. Does scientific management enable the employer to substitute unskilled and low-priced men for high-priced and skilled workers at a moment's notice?
73. Does scientific management result in the degradation of the skilled to the condition of less skilled men?
74. Does scientific management tend to increase the uncertainty and discontinuity of labor?
    a. In the industry.
    b. In general.
75. Does scientific management, by all these means, lessen the bargaining power of the workers generally?
76. Does scientific management, by all these means, tend to reduce the workers to absolute dependence upon the employers?
77. Does scientific management tend to lower the wages of the many permanently?
78. Does scientific management, in the long run, mean simply more work for the same or less pay?
79. Does scientific management tend to lower the standard of living of the workers?
80. Is scientific management, in its relations to labor, really scientific?
    a. Does it violate the fundamental principles of human nature by ignoring temperament and habits?

b. Is it scientific in the determination of the task?

c. Does it disregard, in general, the vital problem of distribution?

d. Has the basic wage of scientific management any foundation in science or justice?

e. Are the premium, bonus and differential piece rates of scientific management scientifically established?

f. Does it take all of the elements into consideration?

g. Does it deal with human beings as it does with the inanimate machine?

81. Can a scientific wage rate or system be determined and established?

82. Does scientific management violate and indefinitely postpone the application of the fundamental principle of justice to distribution?

83. Could scientific management be really scientific, and, at the same time, be inimical to the welfare of the workers?

84. Is scientific management, by its assumption of a scientific nature, inimical to the welfare of the workers?

85. Does scientific management effect any improvement in the general conditions of the shop—heat, light, sanitation, congestion, etc.?

86. Does scientific management tend to disregard the physical welfare of the workers?

87. Does scientific management tend to develop general and long-time economic efficiency?

88. Are elementary time study and motion study and the use of the stop-watch necessary to secure true shop efficiency?

89. Are task setting, piece rates, and the premium and bonus systems of payment of scientific management necessary to secure true shop efficiency?

90. Does scientific management tend to emphasize quantity of product at the expense of quality?

91. Is scientific management capable of any widespread application?

92. Is scientific management a theoretical conception already proven a failure in practice?

93. Are the workers satisfied with scientific management, con-

sidering not only the present workers in the shops, but those who have fallen out and outside workers?

94. Has scientific management created a spirit of antagonism between employers and workers?

95. Do the workers under scientific management look upon their employers as their friends?

96. Have there been strikes under scientific management?

97. Does scientific management tend to accentuate industrial warfare?

98. Is scientific management a guardian of industrial peace, or does it offer any guarantee of industrial peace?

99. Is scientific management opposed to industrial democracy?

100. Is scientific management a reversion to industrial autocracy?

101. Is scientific management a device of the employer for the purpose of increasing production and profit, regardless of consideration for the character, rights, and welfare of the employed?

102. Is scientific management based upon the principle of the survival of the fittest?

103. Does scientific management put into the hands of employers at large an immense mass of information and methods which may be used unscrupulously to the detriment of the worker?

104. Does scientific management increase the possibilities of blacklisting?

105. Does scientific management offer any guarantee that the information and methods which it puts into the hands of employers in general will not be used to the detriment of the workers, i.e., in abuse of its professed principles and practices?

106. Does scientific management satisfy the sense of justice of the workers in general?

107. Does scientific management tend to accentuate the causes of industrial unrest?

APPENDIX VIII

QUESTIONNAIRE

SCIENTIFIC MANAGEMENT AND LABOR

Investigation by the United States Commission on Industrial Relations

INVESTIGATOR

ROBERT F. HOXIE

1915

LIST OF SCHEDULES.

I. The General Character and Organization of the Plant.
II. Time and Motion Study.
III. Task Setting.
III. A. Standardization of Efficiency.
IV. Wages.
IV. A. The Differential Piece Rate System.
IV. B. The Task and Bonus System.
IV. C. The Premium System.
IV. D. The Piece-Rate System.
V. Hiring, Discharge, Discipline, Security and Continuity of Employment.
VI. Vocational Selection, Specialization, Standardization, Instruction and Training, Advancement, Promotion and Demotion of Workers.
VII. A. Effect on Character and Relations of Workers.
VII. B. Effect on Character and Relations of Workers.
VIII. Collective Bargaining and Trade Unionism.
IX. Coöperative Possibilities.

PREFACE

SCIENTIFIC MANAGEMENT AND LABOR

These schedules are based upon two documents which have been prepared in consultation with the parties interested, and which have received their criticism and approval, viz.:

A. The Labor Claims of Scientific Management.
B. The Trade Union Objections to Scientific Management.

These two documents together raise over 200 points of direct issue, i. e., 200 questions which this investigation is bound to attempt to answer.

The most practical approach, therefore, to the data necessary to answer these questions is to frame them in such a way as to get at the primary elements of the situation, as has been attempted in the following schedules. Questions aimed merely at compound facts are useless.

Managers of scientific management shops will undoubtedly think of additional questions needed to bring out elemental facts. The attempt here has merely been made to do the utmost that could be done in advance, to make their task as easy for them as possible, and to standardize the inquiry, as far as can be done at this time, so as to make the answers comparable.

The fullest information is desired which will tend to bring out the distinct character and significance of the various features of scientific management, both in theory and practice, and, wherever the questions are not so framed as to bring out the special characteristics or modifications of any system in a certain plant, the managers answering are invited to insert supplementary or additional questions which more nearly illustrate their particular point of view.

Definition of Terms.—In all questions in the following schedules, the terms *workers, wage-workers* and *wage-working em-*

ployees, as here used, unless otherwise specified, are definitely understood to mean workers in the shop engaged in direct labor in handling materials, tools or machinery. These terms, in all answers to questions given, are understood to exclude foremen and assistant foremen in the shop, employees whose main services are in the planning room, messengers, and all office workers.

SCHEDULE I

THE GENERAL CHARACTER AND ORGANIZATION OF THE PLANT

1. What is the style or name of this enterprise?
2. What is the industrial type (corporation, partnership, etc.)?
3. What is the general nature of the industry? Into what departments or sections is the establishment divided, and what is the character of the product turned out in each department or section?
4. Name the officers and briefly designate their duties.
5. What is the number of wage working employees?
   a. Normally.
   b. At present.
6. If this is a scientific management establishment:
   a. What system or systems does it represent?
   b. When was the installation of scientific management begun?
   c. Under whose direction was the installation of scientific management begun, and by whose direction continued? Give names and periods of service.
   d. Has scientific management been applied to the establishment as a whole?
   e. If scientific management has been applied to the establishment as a whole:
      1. Is the installation complete? If so, give date of completion.
      2. If incomplete, what proportion of the whole has been done?
      3. Who were the systematizers or experts in charge, and what were the periods of service of each?
      4. Tabulate number of workers under 16 years of age, 16-20, 20-30, 30-40, 40-50, 50-60, designating sex and conjugal condition.

        a. Normally.
        b. At present.
        c. What nationalities are represented and in what proportions?

    f. If scientific management has been applied to part of the establishment only, to what part or sections has it been applied?

    g. In the case of each of these parts or sections to which scientific management has been applied:
        1. What is the nature of the work?
        2. Is the installation complete; if so, give date of completion.
        3. If incomplete, what work, and what proportion of the whole work has been done?
        4. Who have been the systematizers or experts in charge, and what have been the periods of service in each case?

7. In the installation of scientific management in this plant:
    a. From whom did the initiative come?
    b. What were the motives and purposes of those who desired the installation?
    c. What conditions led to the installation?
    d. Did the workers have any voice in deciding whether scientific management should be installed or not? If so, what?

8. State the special conditions under which the plant has been operating since the installation of scientific management or at the present time, which might have interfered or now interfere with the normality of the situation and with results.

9. Is it the ideal and purpose to establish one system of work and mode of payment for all the wage-working employees of this establishment? If so, what?

10. What systems of work and modes of payment are actually in use?
    a. Day work and day wage?
    b. Piece work and piece wage?
    c. The Differential Piece-Rate system?
    d. The Task and Bonus system?
    e. The Premium system?

f. Any other system or systems?

g. Profit-sharing in connection with any of these plans or systems?

11. For what kinds of work and classes of employees are the different systems or plans of payment in use employed, to what extent, and for what reasons are they employed in each case?

12. Is a definite standard task set the worker, and, if so, in connection with what systems of work and modes of payment?

13. For what kinds of work is the task set, and what are the number and proportion of the wage-workers in the establishment operating under the task system?

14. Is it designed to extend the task system? If so, why? If not, why not?

15. Is the task set primarily with reference to a piece of work, or to a period of time occupied? If the latter, what are the standard units of time?

16. Is a definite standard scale of work or accomplishment established for workers, and, if so, in connection with what systems of work and modes of payment?

17. For what kinds of work is the standard scale of accomplishment employed, and what are the number and proportion of wage-workers in the establishment operating under this system?

18. Is it designed to extend this system? If so, why? If not, why not?

19. Is the scale of accomplishment fixed primarily with reference to a piece of work or to a period of time occupied? If the latter, what are the standard units of time?

20. Is the sales department able to secure a regular supply of orders for the plant?

a. In normal times.

b. At present.

21. Does this establishment manufacture only for orders or for stock, and if chiefly for orders, what part of the work can be done economically for stock in an attempt to regularize production?

22. Has the plant capacity for the manufacture of by-prod-

ucts or of supplementary products, through which it can regularize production?

23. Is production seasonal? If so, in what way and to what extent?

24. Has the plant a central planning room? Are there branch planning departments?

25. How many employees in the planning room are persons promoted from the shop? How many have been brought in from outside?

26. Describe in brief the general system of industrial operation employed in this establishment, i. e., the steps in the process of turning out an order from the time it is received until it is ready for delivery. Illustrate with blank forms.

27. In this establishment, what is the proportion of the so-called unproductive to the productive workers, i. e., the proportion of those engaged in clerical or supervisory work as compared with those working in the shop with tools, machinery and materials?

28. Select a department of the plant that you consider most typical of your scheme of organization, and state to what person or persons a worker, going to work in that department, is immediately and directly responsible.

29. Who stands next in the line of responsibility above these persons or this person?

30. Give the line of responsibility as far as it goes, and wherever the worker is responsible to two or more persons for different functions, are there any gaps or overlapping between these functions?

31. Give a brief summary statement of the methods of ascertaining costs.

32. To what extent has the output of your plant increased under scientific management?

33. To what extent is the increase of output in your establishment, since the installation of scientific management, due to new or better equipment or relocation of machinery?

34. Aside from time and motion studies and the modes of payment, what special means have been contrived or adopted in this establishment, for the saving of waste

the saving of time, the increase of efficiency and output, and the improvement of the quality of the product? Give specific descriptions.

35. What proportion of the increase of efficiency and output, which has resulted from the installation of scientific management in this establishment, do you ascribe to improved methods and contrivances as over against increased efficiency emanating from the workers themselves?

36. Does scientific management, in this establishment, standardize equipment, tools and materials? If so, to what extent and in what ways do the workers profit by the standardization of tools, materials, etc.?

37. Do the modes of payment employed by scientific management tend to fix the attention of the worker on quantity of output and so endanger the quality of the product?
    a. If not, why not?
    b. If so, how does scientific management offset this tendency?

38. Does scientific management, in this establishment, improve the quality of the product? If so, how? If not, why not?

39. Are the cost accounts of the plant completely tied into the commercial accounts of the plant?

40. Does the authority in the plant which has charge of financial arrangements have thorough general knowledge of the problems of works management?

41. Under scientific management, is the worker considered an expense or an investment, and, if as an investment, why?

42. Is there any form of minimum wage in operation in the plant?
    a. By an hourly rate.
    b. By a day rate.
    c. By a weekly rate.

43. Is the labor of the plant purchased by specifications? If so, to what extent; what is the nature of the specifications?

44. Is the plant, in whole or in part, a union shop, an open shop, a preferential shop or a non-union shop?

45. In so far as it is unionized, with what unions are the employees affiliated?

46. Are there any internal organizations of employees? If so, what are their character and functions?

47. Is there any permanent joint board for adjustment of relations between the management and the employees? If so, what are the character and functions?

48. To what extent do you consider the plant thoroughly protected by safety devices?
    a. Fire,
    b. Accident.
    c. Other.

49. What has been the number of accidents in this plant since the installation of scientific management? Describe your accident records.

50. Is any study made of sanitation in the plant? If so, what?

51. Is any study made of occupational diseases, to which employees of the plant are subject? If so, what?

52. Is there a factory nurse? If so, specify duties. Are records kept in this connection? If so, what?

53. Out of his pay envelope, every employee either does or does not plan out his living needs. To what extent do the workers, or does the plant, or do both provide in any way for the following needs of life:
    a. Savings
    b. Illness
    c. Accident
    d. Unemployment
    e. Old age pensions
    f. Life insurance
    g. Purchasing
    h. Housing
    i. Health
    j. Education
    k. Recreation

54. Is favoritism in the treatment of employees, in this establishment, eliminated under scientific management? What proofs can you offer?

55. In the event of disagreement between a workman and a

foreman or an assistant foreman, what source of appeal has the workman?

56. Are the workers in this establishment supposed to work continuously throughout the day? If not, what periods of rest and recreation are allowed the workers of the different classes? Are these periods of rest and recreation enforced or are they optional with the workers?

57. If rest and recreation are allowed during the working day:
    a. What forms do they take?
    b. What means are provided by the management?

58. Are the workers in any classes of work debarred from conversation during work? If so, why?

59. Are the workers in any class of work debarred from looking out of windows during work? If so, why?

60. Are any rules made and enforced in this establishment in regard to the retiring of workers during work hours? If so, what?

61. Are the workers in any classes in this establishment free to do what work they please, being paid accordingly, and free to leave the shop for the day at any time? If not, why not?

62. How do the hours of labor in the classes of work under scientific management, in this establishment, compare with the hours of labor:
    a. In the classes of work of a substantially similar nature not under scientific management?
    b. In the same classes of work in shops of this region not under scientific management?

63. Have there been any changes in hours of labor in this establishment since scientific management was installed? If so, what?

64. In case of lack of work during a portion of the day due to breakdowns, lack of machinery or tools, lack of materials or orders:
    a. Is the worker retained in the shop or sent home?
    b. Does he receive pay during the time when there is no work? If so, on what basis?

65. Compare the extent of unavoidable breakdowns and delays in the different sections under scientific management in this establishment with:

a. The same sections before scientific management was installed.

b. The non-scientific management sections of the establishment.

66. How does the extent of delays over which the worker has no control, due to breakdowns, lack of machinery or tools, lack of materials, compare in scientific management shops with non-scientific management shops, judging from your experience?

67. By what process is it assured that the workers in each class of work shall have the proper tools and materials at the proper time and place:

a. General statement

b. Concrete illustration

How completely are delays and difficulties, occasioned by the lack of the above process, eliminated in this shop?

68. Is the same basic wage established for women as for men when the work is identical?

69. Are women paid at the same rate as men for the same kind and degree of efficiency and output?

70. Should the same basic wage, and the same rates of payment, and the same total amounts be paid to women as to men when the work is identical, and the same kind and degree of efficiency and output exist? If so, why? If not, why not?

71. Where the output of women is greater than the output of men, under identical conditions, should the women receive a higher rate per unit produced? If not, why not? If so, why?

72. What is the relation of breakage loss to pay roll, in this establishment

a. Under scientific management?

b. Before scientific management was installed?

73. How has scientific management, in this establishment, affected:

a. Overtime?

b. Part time?

c. Holiday and Sunday work?

d. Night work?

e. Vacations?

74. What is the extent of spoiled or inferior work under scientific management, in this establishment, as compared with the situation in the shop before scientific management was installed, and as compared with other shops of similar nature?
75. Are there any shop or department committees of employees in this establishment? If so, what are their nature and functions?
76. Has the shop any workmen's accident committee?
77. To what extent does scientific management in this establishment add to the clerical duties of the workers or reduce their clerical duties?
78. Where these clerical duties are performed by others than the workers, is the performance of such clerical duties satisfactory or harassing to the workers?
79 Under functional foremanship, do the workers come into more personal contact with the higher management than they did before? If so, in what ways specifically does this result?
80. If a worker has ideas for better methods of doing the work, to whom does he make his suggestions? If he makes them to a specified person, and that person turns the suggestions down, can the worker carry them to anyone else without friction? If so, to whom?
81. Is there any organized machinery in this establishment, by which a worker whose soldiering interferes with the work of other workers is disciplined by his fellow-workers?
82. Is there any regular machinery by which a worker can formally and officially have his complaint passed on by his fellow-workers before he takes it to the management?
83. Does scientific management, in this establishment, tend to make workers more or less interested in each other's work than under other forms of management? State the grounds for your answer.
84. Do you believe that scientific management, in this establishment, insures just treatment of the individual worker?
    a. What grounds have you for this belief?

b. What proofs can you supply from the labor experience of this establishment?

85. Do you regard the interests of the employers and workers as identical? If so, in respect to what matters?

86. Has the development of scientific management in theory and practice been due primarily to the direct experience of employers or to the studies and practice of industrial engineers? State the grounds for your conclusion.

SCHEDULE II

TIME AND MOTION STUDY

1. Are any uses made in this establishment of elementary time and motion study, or of the results and records of such studies?
   - *a.* If not, why not?
   - *b.* If so, what are these uses, specifically stated? Enumerate the specific ways in which time and motion studies affect the work and dealings in this establishment, and benefit it and its employees.
2. Have the wage-workers of this establishment any voice in these matters?
   - *a.* If not, why not?
   - *b.* If so, what, and how is it expressed?
3. Have elementary time and motion studies been made in this establishment?
   - *a.* If not, why not?
   - *b.* If so,
     - 1. To what extent?
     - 2. Is it intended to continue making such studies?
4. For what specific purposes are time and motion studies made in this establishment?
5. Just what is the process of making time and motion studies in this plant, and what are the specific conditions under which they are made?
   - *a.* General description.
   - *b.* Concrete examples.

6. Have the wage-workers of this establishment any voice in this matter?
   - *a*. If not, why not?
   - *b*. If so, what and how is it expressed?
7. What are the specific items recorded in making time and motion studies, and in what form are the records of such studies kept?
   - *a*. General description.
   - *b*. Concrete illustrations.
8. In making time and motion studies in this plant, how many men are employed on each study and what are their functions?
9. By whose authority, and by whom are the time and motion study men employed and paid in this establishment?
10. Have the workers of this establishment any voice in this matter?
    - *a*. If not, why not?
    - *b*. If so, what and how is it expressed?
11. What qualifications are demanded of the time and motion study men employed in this establishment?
12. Have the wage-workers of this establishment any voice in this matter?
    - *a*. If not, why not?
    - *b*. If so, what and how is it expressed?
13. Who are the time and motion study men who have been employed in this establishment and what are the records of each, training, experience, etc.?
14. Are the time and motion studies in this establishment made openly or secretly?
15. Is the stop-watch used in making these studies? Has the concealed stop-watch ever been used?
16. Are the time and motion studies in this establishment made in the presence of the workers in the shop?
17. How are the men selected in this establishment upon whom time and motion studies are made?
    - *a*. Method.
    - *b*. Is any compulsion used in this connection?
    - *c*. Have the workers themselves any choice in this matter? If so, what and how is it exercised?

18. Do the men on whom time and motion studies are made in this establishment receive any extra remuneration, or reward, or gift, bonus or privilege?
19. What instructions are given to the men timed in respect to their work under test? How are they asked and expected to work?
20. Are the purposes of time and motion studies carefully explained to the men beforehand?
    a. To the particular men timed?
    b. To the body of men in the group or shop?
21. Have the workers of this establishment made any objections at any time to the making of these time and motion studies, to the methods employed, to the use of the stop-watch?
    a. If so, what?
    b. If so, how have these objections been brought to the attention of the management? How have they been considered, and with what result?
22. Have any workers left this establishment because of the introduction of the use of time and motion studies?
    a. If so, how many and under what circumstances?
23. Has the attitude of the workers in this establishment changed towards time and motion studies?
    a. If so, how and why?
24. How does timing affect the worker under test?
    a. Nervously and physically, why?
    b. As to speed and quality of work, why?
25. Do you regard time studies as essential in securing an even flow of production through the shop? Can schedules be maintained without time studies, or can routing of material be maintained without time study?
26. Do elementary time and motion study promote the training of the workers? If so, how?
27. Are elementary time and motion study essential or necessary to the process of mutual adaptation of the worker to the work?
28. Are elementary time and motion study necessary to the standardization of performance? If so, why?
29. Are elementary time and motion study necessary for the elimination of systematic soldiering? If so, why?

30. Do elementary time and motion study eliminate the chief causes of speeding up? If so, how?

31. Do elementary time and motion study make possible the substitution of piece work, or task work, and the piece rate, bonus, differential piece rate and premium systems of payment where before day work existed or was only possible?
    a. If not, why not?
    b. If so,
        1. Why?
        2. In what classes of work, and to what extent?

32. Have elementary time and motion study actually resulted in the substitution of such modes of work and payment in this establishment? If so,
    a. In what classes of work?
    b. To what extent?

33. Are elementary time and motion study necessary in order that the workers should be furnished with the proper tools and materials at the proper time and place?
    a. If so, why?

34. Do elementary time and motion study in this establishment actually result in the furnishing to the workers of the proper tools and materials at the proper time and place? Are they actually so effective?
    a. If not, why not?
    b. If so, to what extent?

35. Are elementary time and motion study necessary in order to substitute exact knowledge for guesswork in the payment of wages? If so, why?

36. To what extent do elementary time and motion study in this establishment substitute exact knowledge for guesswork in the payment of wages?

37. Are elementary time and motion study necessary to secure justice to the worker and as between worker and worker payment exactly in proportion to efficiency? If so, why?

38. To what extent do elementary time and motion study actually secure justice to the worker as between worker and worker, and secure payment in proportion to efficiency? Are they actually so effective?

a. If not, why not?
b. If so, to what extent?

39. Are elementary time and motion study necessary to secure reasonable or highest efficiency on the part of the workers?
    a. If so, why?
    b. If so, in what classes of work and for what kinds of workers, and why?
40. Are elementary time and motion study necessary in order to secure exact cost prediction for each kind of product turned out? If so, why?
41. To what extent do elementary time and motion study actually make possible such accurate cost prediction in this establishment? Are they actually so effective?
    a. If not, why not?
    b. If so, to what extent?
42. To what extent do elementary time and motion study make possible accurate cost accounting? Are they actually so effective?
    a. If not, why not?
    b. If so, to what extent?
43. Are elementary time and motion study necessary to eliminate ignorant bidding on orders, and the selling price of shop products? If so, why?
44. To what extent do they thus eliminate ignorant bidding? Are they actually so effective?
    a. If not, why not?
    b. If so, to what extent?
45. Are elementary time and motion study necessary to eliminate the arbitrary cutting of the wage rates, and the arbitrary alteration of the tasks? If so, why?
46. To what extent do elementary time and motion study actually prevent the arbitrary alteration of the tasks, and the cutting of the wage rates in this establishment? Are they actually effective in this respect?
    a. If not, why not?
    b. If so, to what extent?
47. Are there any reasons why time and motion study results should not be made public?
    a. If not, why not?

b. If so, why?

48. Have the results of time and motion study made in this establishment been made public?
49. What is the theory or philosophy of time and motion study?
50. To what extent does judgment enter into the making of time and motion studies and the recording of the results which are to be used as task or work standards? To what extent are the process and result actually a matter of judgment rather than a matter of exact scientific demonstration?

SCHEDULE III

TASK SETTING

In the following analysis, questions 1 to 8 refer to the task viewed from the standpoint of the character and scope of the operation or operations involved, i. e., how big a section of the manufacturing process is included in the standard task. The remaining questions refer to the task viewed from the standpoint of the amount of work or amount of accomplishment required in a given time, or the amount of time allowed for doing the standard task unit once.

1. In the case of task setting, how are the nature of the task and of the task unit determined:
    - *a.* Is the existing or established division of work into separate operations or the existing division of labor used as the guide?
    - *b.* Is the process of manufacture, considered as a whole, subjected to re-analysis, and a new set of operations and division of labor established?
2. In the determination of the actual task unit, is the attempt made to further subdivide, or to combine previous unit operations?
3. In the determination of the actual task thus, does the unit of operation represent more or less specialization than under the old situation?

4. In the determination of the character of the task thus, what is the ideal or end aimed at by the management, i. e., what is the conception of the proper nature of the task? What should constitute a task?
5. Where the process of manufacture is re-analyzed for the purpose of determining the character of the task, does this analysis involve time and motion study?
    - *a.* If not, what is the actual process of analysis, and of the determination of the nature of the task unit?
    - *b.* If so, just what part do time and motion study play in this re-analysis, and in the determination of the nature of the task? How do they assist in this work?
        1. General statement.
        2. Concrete illustration.
6. Have the workers objected to the nature of the tasks thus set? If so, on what grounds, and how? Is any machinery or process provided for the presentation of such objections?
7. In case of objections by the workers to the nature of the tasks, are these objections considered by the management? If so, by whom and how? Is any machinery or process provided for such consideration?
8. What has been the result or effect of such objections?
9. In setting the standard time allowed for the doing of the task, what is the ideal sought, i. e., what is the conception, on the part of the management, of the proper standard time allowance for the task?
10. Are time and motion study used in setting the standard time allowed for doing the standard task?
11. If not, just how is the standard task time determined or set?
12. Where time and motion study are used, after the character of the task is determined, just what is the actual process of fixing the standard time allowed for the task?
    - *a.* General description
    - *b.* Concrete illustration
13. How do the tasks in your establishment compare with those in the same classes of work before scientific management was installed?
14. Is it the purpose in your establishment to increase the

extent of the tasks as improvements in machinery, tools, materials and methods are made? If so, what is the rule as to the increase of tasks under such circumstances?

15. Is it the purpose in your establishment to increase the extent of the task as the ability of the worker increases? If so, what is the rule as to the increase of tasks under such circumstances?
16. In setting the time allowed or extent of the task thus, is the task timed as a whole, or is it analyzed into its elementary motions, and time study made of each, the total time being a summation of these elementary times?
17. In setting the task thus, is a time study actually made of each task in the shop so set, or is the extent of the task or the time allowed for it determined by a summation of elementary time studies previously made or elsewhere made?
18. In setting the task thus by means of time (and motion) study:
    - *a.* How many individual workers are timed on the task or its elements before the task is set? Who determines this? Have the workers any voice? If so, what?
    - *b.* How many time studies are made on each individual worker timed before the task is set? Who determines this? Have the workers any voice? If so, what?
    - *c.* How are the individual workers, who are timed on the particular task, selected?
        1. Are they the fastest men; average men; slow men; or representatives of different speed classes? If so, what classes, and in what proportions?
        2. Who determines which men shall be thus timed?
        3. Do the individuals timed have any choice or discretion in this matter? If so, what?
        4. Do the workers, as a group, have any choice or discretion in this matter? If so, what, and how is it exercised?
    - *d.* Have the workers individually, or as a body, any voice or discretion in the determination of the extent of

the task or the time allowed for it? If so, how is this voice or discretion exercised?

e. Would it be possible to have two time study men or task setters in the shop, acting jointly, one appointed and paid by the management, and one by the workers? If not, why not?

f. Would it be possible or practicable to have the time study men or time setters jointly appointed and paid by the management and the workers? If not, why not?

19. Where time studies for the setting of a particular task are made on several individuals, or where several studies are made on one individual, what time is taken as standard by which to set the task (the shortest time, the times averaged, the modal time, or what)? Why is it adopted?

20. In setting the task thus by means of time (and motion) study, is any allowance made for the "human factor," over and above the elementary times sum or the elapsed test time?

21. If so, just how is the allowance determined?
    a. General statement.
    b. Concrete illustration.

22. In the setting of the task thus by means of time (and motion) study, is any allowance made for breakdowns and delays over which the worker has no control?

23. If so, just how is this allowance determined?
    a. General statement
    b. Concrete illustration

24. In the setting of the task thus by means of time (and motion) study:
    a. Are any special physiological or psychological studies made of the workers timed with reference to the immediate effect upon them in the way of exhaustion or nervous strain or with reference to the long-time effects of the work at the speed attained?
        1. Any studies of fatigue? If so, what?
        2. Any special psychological tests? If so, what?
        3. Any special physiological tests? If so, what?
    b. Just how is it determined that the task set will not

be injurious to them immediately or in the long run?

25. In setting the task thus by means of time (and motion) study:
    - *a.* Are any special physiological or psychological studies made of the workers not timed, the general body of workers in the shop who are to perform the work, with reference to their ability to perform the task set without nervous strain, exhaustion or long-time evil results:
        1. Any studies of fatigue? If so, what, and to what extent numerically?
        2. Any special physiological studies? If so, what, and to what extent numerically?
        3. Any special psychological studies? If so, what, and to what extent?
26. Have the workers objected to the amount or extent of the tasks thus set? If so, on what grounds, and how? Is any machinery or process provided for the voicing of such objections?
27. In case of objections by the workers to the amount and extent of the tasks, are these objections considered by the management? If so, by whom and how? Is any machinery or process provided for such consideration?
28. What has been the result or effect of such objections?
29. Is the making of the task and bonus in your establishment entirely voluntary on the part of the workers? What happens to the worker who does not pretty consistently make the task?
30. What number and proportion of workers who have been tried out on the tasks in the different classes of work in this establishment failed ultimately to make the task
    - *a.* Altogether?
    - *b.* One-third of the time?
    - *c.* One-half of the time?
    - *d.* Three-fourths of the time?
31. Is task setting necessary to secure reasonable or the highest efficiency? If so, for what classes of work and for what kinds of workers and why?

32. What is there under scientific management that prevents unfair distribution of work?

33. Does scientific task setting promote the training of the workers? If so, how?

34. How does scientific management insure that the task is set with due relation between quantity and quality, i. e., so as to insure no falling off in quality?

35. In the setting of a task, just how is it proved to be right or wrong?
    a. Just what are the basis and terms of the proof?
    b. Just what is the process of proof?

36. Does observation disclose that the tasks in the scientific management sections of this establishment are generally or in particular cases specialized:
    a. More or less than in the non-scientific management sections where the work is of a similar nature?
    b. More or less than in non-scientific management shops where the work is of a similar nature?

37. Does observation disclose that the workers in this establishment operating under the task system are generally, or in any particular cases:
    a. More or less speeded up than the workers in the non-scientific management sections where work is of a similar nature?
    b. More or less speeded up than the workers in non-scientific management shops of a similar nature?
    c. More or less speeded up than the workers operating under other systems of work?

38. Does observation disclose any overspeeded, overfatigued or exhausted workers operating under the task system in this establishment?

39. To what extent is the increased efficiency of this establishment under scientific management secured without any added exertion on the part of the workers, e. g., to what extent is any speeding-up under scientific management a speeding-up of machinery solely?
    a. Give concrete illustration

SCHEDULE III-A

STANDARDIZATION OF EFFICIENCY

In the following analysis, questions 1 to 8 refer to the character and scope of the operation or operations involved in the "unit of work," i. e., how big a section of the planning, scheduling and dispatching process is included in the standard "work" unit?

Questions 9 to 38 refer to amount of work or accomplishment required to attain a given degree of efficiency or a percentage of efficiency, or the amount of time allowed for accomplishing the "unit of work" with a given percentage of efficiency.

1. In the case of efficiency gradation, how is the nature and scope of the "unit of work" determined?
   - *a.* Is the existing or established division of work into separate operations or the existing division of labor used as the guide?
   - *b.* Is the process of planning, scheduling and dispatching considered as a whole, or subjected to re-analysis, and a new set of operations, and division of labor used?
2. In the determination of the "unit of work," is the attempt made to further subdivide or to combine previous unit operations?
3. In the determination of the method of work thus, does the unit of operation represent more or less specialization than under the old situation?
4. In the determination of the character of the "unit of work" thus, what is the ideal or end aimed at on the part of the manager, what is his conception of the proper nature of the work unit?
5. Where the processes of planning, scheduling and dispatching are re-analyzed for the purpose of determining the character of the work unit, does this re-analysis involve time and motion study?
   - *a.* If not, what is the actual process of analysis, and of the determination of the nature of the work unit?

   b. If so, just what part do time and motion study play in re-analysis, and in the determination of the nature of the work unit? How do they assist in this?
      1. General statement
      2. Concrete illustration

6. Have the workers objected to the nature of the work units thus set? If so, on what grounds and how? Is any machinery or process provided for the presentation of such objections?
7. In the case of objections by the workers to the nature of the work units, are these objections considered by the management? If so, by whom and how? Is any machinery or process provided for their consideration?
8. What has been the result or effect of such objections?
9. In determining the scale of efficiency, or the time allowed for doing each unit of work, with a given efficiency percentage, what is the ideal sought, i. e., what is the conception on the part of the management of the proper efficiency scale for the work unit; or, to put it in other words, what represents normal efficiency, or 100 per cent?
10. Is it possible to establish a just scale of efficiency for each class of work? If so, how is the justice of the scale to be arrived at or determined? What is the proof of its justice?
11. What factors are considered in each case in determining the efficiency, i. e., what shall be regarded as 100 per cent. efficiency, 50 per cent. efficiency; just how is the efficiency scale arrived at in each case?
12. Are time and motion study used in establishing the scale of efficiency in connection with the performance of the "work unit"?
13. If not, just how is the scale of efficiency determined?
14. Where time and motion study are used, after the character of the "unit of work" is determined, just what is the process of determining the scale of efficiency in connection with the performance of work?
   a. General description
   b. Concrete illustration
15. In determining the scale of efficiency thus, is the "unit

of work" considered as a whole, or is it analyzed into its elementary motions, and time study made on each, the total time representing a given percentage of efficiency being a summation of these elementary times?

16. How do the efficiency scales in your establishment compare with the same classes of work before scientific management was installed?

17. Is it the purpose in your establishment to change the efficiency scales as improvements in machinery, tools, materials and methods are made? If so, what is the rule governing such changes?

18. Is it the purpose in your establishment to change the efficiency scales as the ability of the workers changes? If so, what is the rule governing such change?

19. In determining the efficiency scale thus, is a time study made of each unit of work actually to be performed, or is the scale of efficiency determined by a summation of the elementary time studies previously made or elsewhere made?

20. In the determination of the efficiency scale thus by means of time and motion study

- *a*. How many individual workers are timed on the work unit or these elements before the efficiency scale is set?
    1. Who determines this?
    2. Have the workers any voice? If so, how?
- *b*. How many time studies are made on each individual worker timed before the efficiency scale is set?
    1. Who determines this?
    2. Have the workers any voice? If so, how?
- *c*. How are the individual workers who are timed on the particular work unit selected?
    1. Are they the fastest men, average men, or slow men, or representatives of different speed classes? If so, what classes, and in what proportions?
    2. Who determines which men shall be thus timed?
    3. Do the individuals timed have any voice or discretion in this matter? If so, what, and how is it expressed?

4. Do the workers, as a group, have any voice in this matter? If so, what, and how is it expressed and exercised?

d. Have the workers individually or as a body any voice or discretion in the determination of the scale of efficiency? If so, how is this voice or discretion exercised?

e. Would it be possible or practicable to have two men to determine the scale of efficiency, one appointed by the management and one by the workers? If not, why not?

f. Would it be possible or practicable to have the time study man or men who determine the scale of efficiency jointly appointed and paid by the management and the workers? If not, why not?

21. Where time studies for the determination of the scale of efficiency are made on several individuals, or where several studies are made on one individual, which result is taken as the standard by which to determine the efficiency scale, the shortest time, the time averaged, the modal time, or what?

22. In determining the scale of efficiency thus, by means of time and motion study, is any allowance made for the "human factor" over and above the elementary times sum, or the elapsed test time?

23. If so, just how is this allowance determined?
   a. General statement.
   b. Concrete illustration.

24. In determining the efficiency scale thus by means of time and motion study, is any allowance made for breakdowns and delays over which the worker has no control?

25. If so, just how is this allowance determined?
   a. General statement.
   b. Concrete illustration.

26. In determining the scale of efficiency thus, by means of time and motion study,

a. Are any special physiological or psychological studies made of the workers timed with reference to the immediate effect upon them in the way of exhaustion

or nervous strain, or with reference to the long-time effects of the work at the speed attained?
    1. Any studies of fatigue? If so, what?
    2. Any special psychological tests? If so, what?
    3. Any special physiological tests? If so, what?
  b. Just how is it determined that the scale of efficiency established will not be injurious to them immediately or in the long run?

27. In determining the scale of efficiency by means of time and motion study
  a. Are any special physiological or psychological studies made of the workers not timed, the general body of workers who are to do the work, with reference to their ability to attain standard efficiency without nervous strain, exhaustion, or any other evil results?
    1. Any studies of fatigue? If so, what and to what extent numerically?
    2. Any special psychological studies? If so, what and to what extent numerically?
    3. Any special physiological studies? If so, what and to what extent numerically?

28. Have the workers objected to the efficiency scale thus set? If so, on what grounds, and how? Is any machinery provided for the voicing of these objections?

29. In case of objections by the workers to the scale of efficiency, are these objections considered by the management? If so, by whom, and how? Is any machinery or process provided for their consideration?

30. What has been the result of the effect of such objections?

31. *Is the making of an efficiency percentage sufficient to secure a premium payment in your establishment* entirely voluntary on the part of the worker? What happens to the worker who does not pretty consistently attain this degree of efficiency?

32. What number and proportion of the workers who have been tried out on the different classes of work in this establishment failed to make the percentage of efficiency necessary to receive a premium payment?
  a. Altogether
  b. One-third of the time

c. One-half of the time

d. Three-fourths of the time

33. Does standardization of efficiency promote the training of the workers? If so, how?

34. How does scientific management insure that the efficiency scale is related to the scale of premium payments so that there will not be a tendency on the part of the workers to neglect quality for quantity?

35. Does observation disclose that the "unit of work" in the scientific management section of such establishments is generally or in particular cases specialized?

    a. More or less than in the non-scientific management sections where work is of a similar nature?

    b. More or less than in the non-scientific management shops where work is of a similar nature?

36. Does observation disclose that the workers in these establishments, operating under the scale of efficiency set, are generally or in particular cases

    a. More or less speeded up than the workers in the non-scientific management sections, where work is of a similar nature?

    b. More or less speeded up than in non-scientific management establishments, where work is of a similar nature?

    c. More or less speeded up than workers operating under other systems of work?

37. Does observation disclose any overspeeded, overfatigued or exhausted workers, operating under the efficiency scale in this establishment?

38. To what extent is the increased efficiency in this establishment under scientific management secured without any added exertion on the part of the workers, e. g., to what extent is any speeding up under scientific management a speeding-up of machinery solely? Give concrete illustration.

SCHEDULE IV

WAGES

1. What is your general theory of wages?
2. In how many departments, affecting how many workers, does the management now fix wages by treating with the individual employees?
3. What are the main reasons because of which the management believes in individual bargaining?
4. To what extent has this establishment made use of collective bargaining in determining basic or other wage rates, i. e., what classes of work and how many individuals have had their wages determined by such collective bargaining:
   a. Before the introduction of scientific management?
   b. Since the introduction of scientific management?
   c. What will be the probable tendency in the future?
5. To what extent has the management made wage agreements with the unions:
   a. If at all, why?
   b. If not, why not?
6. When scientific management was installed in this establishment, were the base wage, the wages or the wage rates (not earnings) on any classes of work lowered?
   a. If so, to what extent and why?
   b. How many workers were affected?
7. When scientific management was installed in this establishment, were the base wage, the wages or the wage rates on any classes of work raised?
   a. If so, why and to what extent?
   b. How many workers were affected?
8. What actual base wages have you paid the different classes of workers in this establishment since scientific management was installed?
9. How do these base wages compare with those of the same classes of workers in the region, not under scientific management? With the trade union wage standards of the region, for the same classes of workers?

10. In those departments of this establishment under scientific management, what is the present average daily wage of all employees as compared with the average wage for the same group before the introduction of the new system?
11. How do the average earnings of the workers, as a whole, in this establishment, under scientific management, compare with the average wages or earnings of the same classes of workers
    a. In non-scientific management shops of this region?
    b. Demanded by the union scales?
12. What have been the average earnings, in this establishment, of the workers in the different classes of work under each of the systems of payment in use, during the past year?
13. What are the relative wages or earnings of the skilled, unskilled and semi-skilled workers in the scientific management portions of this establishment as compared with the relative wages or earnings of skilled, unskilled and semi-skilled workers
    a. In the same sections of the establishment before scientific management was installed?
    b. In the non-scientific management sections of this establishment?
    c. In non-scientific management shops of this region?
    d. The union scale?
14. How is it possible to decide that different kinds of work and different classes of workers should be paid at different rates with respect to base wage, piece or bonus rates, premium rates, etc., and what the actual differences should be in order that each class should be paid in proportion to efficiency? What is the process by which these differences are actually determined in this establishment?
15. Does scientific management make standards of wages more or less flexible?
16. In determining bonuses and premiums does the management at first install the premiums and bonuses which they believe will be final, or do they introduce a lower scale (allowing for possible error in calculations as to

what they can afford) and eventually raise those bonuses?

17. To what degree are the primary determinations of wage rates found to bear the test of experience?

18. Workers often object to the introduction of piece rates because they fear an eventual lowering of the rate. Has this establishment found that they bring the same objection against other advanced payment systems?

19. How does the management demonstrate to them that real scientific management is in itself a guarantee against rate cutting?

20. Would your present shop efficiency be possible under any other form of management, such as a coöperating scheme?

21. Could any such scheme be as efficient without piece rates and the premium and bonus systems?

22. Will day work and day wage ever secure reasonable or the highest efficiency? If so, under what circumstances?

23. Does scientific management mean ultimately the complete elimination of day work and day wage?
    a. If so, why?
    b. If not, where are day work and day wage scheduled for permanent retention? Under what conditions and for what kinds of work?

24. Are the wage-workers in this establishment paid exactly what they are worth, in each case, or in exact proportion to their efficiency?
    a. If not, why not?
    b. If so, just how is the exact worth or efficiency of the worker determined? What is the proof?

25. What is meant when it is said that scientific management pays men rather than positions?

26. If scientific management pays men rather than positions, what kind of progress in the man does it pay?

27. Is payment based entirely on quantity and quality of production, or is it considered good business to pay men still higher wages regardless of production, when they
    a. Show thought and ambition?
    b. When they exhibit a sense of personal achievement?

c. When they show interest, joy and zest in their work?
d. When they exhibit signs of inventive genius?
e. When they are seen to be energized intellectually?
f. When it is clear that they are growing in self-reliance, self-respect, individuality, personality and dignity?

28. How long have the present wage rates been operative?
29. Are all the wage rates now so carefully determined that the management feels them to be the most economical possible?
    a. If not most economical, why?
30. When it is necessary temporarily to put a higher rate worker on a lower rate job, have you any method of securing for him his regular or higher rate while thus working, e. g., a retainer?
31. Do lower local costs, taxes, rents, subsistence, etc., justify local wage rates, proportionately low?
32. Would increase in the cost of living constitute an effective reason for the advancement of the base wage?
33. Has the base wage ever been increased on this account?
34. How are wages in this establishment affected by general wage rates which alter concurrently with industrial depressions and booms?

SCHEDULE IV-A

The Differential Piece-Rate System

1. When and by whom was the differential piece-rate system installed in this establishment? What system or systems of work and pay did it displace?
2. For what classes of work is it employed, and what are the numbers, proportions and sex of the workers in this establishment operating under it?
3. What were the considerations which led to its adoption, and why was it adopted?
4. By whose authority was it introduced?
5. Did the workers have any voice in determining whether it should be introduced or not? If so, what?

Did the workers or any of them object to its introduction? If so,

- *a.* What class or classes of workers?
- *b.* To what extent?
- *c.* On what grounds, or from what causes?
- *d.* Were the objections of the workers considered? If so, in what manner?

Is it, in general, desirable or practicable for the workers to have any voice in determining whether or not the differential piece rate shall be introduced, or, after it is introduced, whether or not it shall be retained?

- *a.* If not, why not?
- *b.* If so,
  1. Which workers should have such a voice?
  2. How should the workers' choice be expressed?
  3. What consideration should be given to the workers' preference?
  4. How and by whom should a decision be reached?
  5. Should trade unions or trade union officials be allowed any voice in this matter?
     - a. If not, why not?
     - b. If so, what?

8. Is a basic or day wage established in connection with the differential piece-rate system in this establishment, which is paid the workers who fail to make the task?

- *a.* If not, why not?
- *b.* If so, on what basis is it calculated?
- *c.* If so,
  1. How, and by whom, and on what grounds was this day wage fixed for each class of work and workers?
  2. Did the workers have any voice in this matter? If so, what?
  3. Would it be desirable or practicable for the workers to have a voice in this matter?
     - *a.* If not, why not?
     - *b.* If so, why, and how should it be expressed?

  Would it be desirable or practicable to accept, as the basic or day wage in this connection, the standard rate or wage established by trade unions for the class of work in question? If not, why not?

5. Is it desirable or practicable to change the day rate after it has once been established in connection with the differential piece-rate system?
   a. If not, why not?
   b. If so, should the workers have any voice in this matter, and if any, what and how should it be expressed?
6. Has the basic or day wage been changed or altered in any case in this establishment since the differential piece-rate system was introduced? If so, how, by whom, and to what extent?
7. What considerations and circumstances might justify the changing of the base or day wage; would industrial depression, and a fall in general wages constitute a justification?

9. By whom, and how, or on what grounds are the differential piece rates to be paid for each task determined?
10. Have the workers any voice in this matter?
    a. If not, why not?
    b. If so, how is it expressed, and what consideration is given to it?
11. What are the actual differential piece rates on the different classes of work under this system, paid in this establishment?
12. What considerations determine the fixing of the actual differential piece rates, and the amount of difference between them in each case or class of work and workers? Just what factors are considered? Just how is the actual rate in each case determined?
13. Just how are the differential piece rates calculated?
    a. General statement.
    b. Concrete illustration.
14. Are the differential piece rates calculated by the hour, the day, or for some longer period?
    a. If so, what?
    b. On what grounds is this period of calculation fixed?

15. Is it possible to establish just differential piece rates for each class of work? If so, how are just rates to be arrived at or determined? What is the proof of their justice?
16. What entitles a worker to the higher differential piece rate or rates? What factors are considered? What facts and conditions demanded?
17. What deprives a worker of the higher differential piece rate or rates? What factors are considered? What facts and conditions determine?
18. Does the employer derive an advantage under the differential piece-rate system, when the worker almost but does not quite make the task?
    - *a.* If so, what?
    - *b.* If not, why not?
19. Who determines whether or not the higher differential piece rates shall be awarded?
20. Have the workers any voice in this matter? If so, how is it expressed? What consideration is given to it?
21. When the differential piece rates for a task have been once fixed, are they ever changed or cut, raised or lowered?
    - *a.* If not, why not?
    - *b.* If so, by whose authority, why, and on what grounds?
    - *c.* Have the workers any voice in this matter? If so, what workers, and how is their opinion expressed? Are they consulted?
22. To what extent, if any, have the differential piece rates actually been changed in this establishment after having been once fixed, and for what reasons?
23. What considerations might justify the changing of the differential piece rates?
24. When the differential piece-rate system was introduced, was there any conscious effort to secure a select class of workers?
25. If so, by what process were the new workers selected, and the old workers eliminated? What considerations governed? What tests were made?
26. Do the workers now under the differential piece-rate system represent a select class of higher quality as respects

sex, age, initial health, initial training, and ability superior to the old workers at the same work?

27. Since the differential piece rates were introduced in the establishment, what proportion of applicants for work have been hired? How does this compare with the situation before the differential piece rate was introduced?

28. Since the differential piece rate was introduced in this establishment what number and proportion of newly hired workers have failed to make good?

29. When the differential piece-rate system was introduced in each class of work in this establishment:
    a. What number and proportion of the workers who had been doing the work were rejected or dropped out of their particular work immediately, and for what reasons?
    b. What number and proportion were rejected or dropped out of their work within
        1. One month, and for what reasons?
        2. Three months, and for what reasons?
        3. One year, and for what reasons?
    c. What number and proportion of the workers who remained in the particular work, in each case habitually attained the task and received the higher differential rates?
        1. Immediately.
        2. Within three weeks.
        3. Within three months.
        4. Within six months.
        5. Within one year.
        6. Finally.
    d. How long, on the average, did it take the workers who remained in each class of work to reach the point where they habitually made the task and received the higher differential piece rates?
    e. What number and proportion of the workers in each class of work exceeded the task necessary to receive the higher differential piece rates?
        1. Within three weeks.
        2. Within three months.

3. Within six months.
4. Within one year.

Did these workers who exceeded the task receive a still higher differential piece rate?

g. What number and proportion of the workers who remained at the particular work in each class habitually exceeded the task necessary to receive the higher differential piece rates?

30. What proportion of the workers in each case or class of work fall to a lower standard after having attained the task habitually, and so lose the higher differential piece rate?

31. What became of the workers who were rejected or dropped out when the differential piece-rate system was introduced, and during its operation?

a. Were efforts made to retain them? If so, what?

b. To what extent were they given work elsewhere in the establishment?

c. How did the wages of those given work elsewhere in the establishment compare with their former wages?

d. What became of those who were not retained in this establishment?

32. What was the average number of workers in each case or class of work after the differential piece-rate system was introduced as compared with the number previously so employed?

a. During the six months preceding the introduction of the differential piece-rate system?

b. During the six months succeeding the introduction of the differential piece rate system?

c. At present?

d. How are these changes to be explained?

33. What instruction and assistance are provided for the workers when and after the differential piece-rate system is introduced?

a. Who are the instructors, and what is their proportion to the workers?

b. How and by whom are these instructors selected?

c. What are the qualifications required for these instructors?

d. What are their functions? Are they expected to give frequent and minute instructions?

34. What is the nature of the instruction card used under the differential piece-rate system in this establishment?

a. General description.

b. Concrete examples or samples.

35. By what process does the worker secure the instruction cards?

36. Is the worker ever allowed to depart from the instructions on these cards, to invent and use methods of his own?

37. Is the worker allowed or encouraged to make suggestions in regard to instructions and methods?

a. If not, why not?

b. If so, how?

38. What is the degree of punctuality and regularity and continuity of the workers under the differential piece-rate system, as compared

a. With the same workers before the differential piece-rate system was introduced?

b. As compared with the workers not under the differential piece-rate system?

39. What is the degree of variation of output, from day to day, and week to week, of the individual workers under the differential piece-rate system as compared

a. With the same workers before the differential piece-rate system was introduced?

b. As compared with the workers not under the differential piece-rate system?

40. What is the amount of delay between tasks or jobs during the day under the differential piece-rate system, i.e., the amount of time when there is no work for the operator?

a. As compared with the situation before the introduction of the differential piece-rate system?

b. As compared with the workers not under the differential piece-rate system?

41. In case there is no work for part of the day on the particular task on which the worker is engaged

a. Is he set at other tasks?

b. Is he paid for this idle time? If so, on what basis?

c. Does he lose payment according to the higher differential piece rate?

42. If a basic or day wage is used in connection with the differential piece-rate system, what is its amount in each class of work?

43. What were the average and maximum earnings of the workers in each class of work before the introduction of the differential piece-rate system?

44. What have been the earnings in each class of work where the workers just made the task and no more?

45. What have been the average maximum earnings in each class of work under the differential piece-rate system
    a. Within the past six months?
    b. Within any other period?

46. What have been the average actual earnings in each class of work under the differential piece-rate system.
    a. During the past six months?
    b. Within any other period?

47. What have been the average actual earnings of the workers who exceeded the task
    a. Within the past six months?
    b. Within any other period?

48. Have any workers under the differential piece-rate system earned less than the customary wage for the class of work in question in this region?
    a. If so, what have been their numbers and proportion in each class of work?
    b. What has been the amount of time during which they received these lower earnings compared with the time of their service?
    What has been the policy toward such workers?
        1. Have they been discharged, and, if so, after how long a period?
        2. Has any effort been made to place them in other lines of work where they could attain the task, and, if so, what success has resulted from these efforts?
        3. What proportion of them ever succeed in making the task in other lines of work?

49. Is any maximum limit put upon the earnings of the workers under the differential piece-rate system?
50. What system of inspection is used in connection with the differential piece-rate system?
51. Has the minuteness of inspection necessary to secure standard product increased or decreased since the introduction of the differential piece-rate system, and to what extent?
52. What has been the quality of the work turned out since the differential piece-rate system was introduced, as compared with
    a. The same work and workers before its introduction?
    b. The sections of this establishment not under the differential piece-rate system?
53. How does the quantity of work turned out where the differential piece-rate system is in vogue compare with that in the same sections of this establishment before the differential piece-rate system was introduced?
54. How has the introduction of the differential piece-rate system affected the costs of the product?
    a. The labor cost per unit?
    b. The final cost per unit?
55. Do the workers under the differential piece-rate system show any evidences of overspeeding, overfatigue, or nervous or physical exhaustion?
56. Have the character, quality, sex and age of the workers changed where the differential piece-rate system has been introduced? If so, how?
57. What has been the effect of the differential piece-rate system upon the spirit of the shop?
    a. Upon the attitude of the workers toward their work?
    b. Upon the attitude of the workers toward the management?
    c. Upon the attitude of the workers toward their fellows in the group and the shop?
58. Are the workers under the differential piece-rate system in this establishment generally satisfied with the system?
    a. If so, why do they like it?
    b. If not, what do they complain of in connection with it?

59. Do the workers in this establishment prefer the differential piece-rate system to any other system?
    a. If so, how do they show it?
    b. If not, what system do they prefer and why?
60. What has been the effect of the introduction of the differential piece-rate system upon the attitude of the workers toward trade unionism? How do they regard it?
61. Is the differential piece-rate system necessary to secure reasonable or the highest efficiency? If so, for what classes of work and for what kinds of workers, and why?
62. Is the differential piece-rate system necessary in order that each worker shall be paid in exact proportion to his efficiency? If so, why?
63. Does the differential piece-rate system tend to guarantee against arbitrary rate cutting, and the arbitrary alteration of the task? If so, how?
64. Under the differential piece-rate system, after it has been well established, how many less workers does it take in the different classes of work on the average to do a job or turn out a given amount of product, than formerly, i.e., what are the proportions before and after?

SCHEDULE IV-B

The Task and Bonus System

1. When and by whom was the task and bonus system installed in this establishment? What system or systems of work and pay did it displace?
2. For what classes of work is it employed, and what are the numbers, proportions and sex of the workers in this establishment operating under it?
3. What were the considerations which led to its adoption, and why was it adopted?
4. By whose authority was it introduced?
5. Did the workers have any voice in determining whether it should be introduced or not? If so, what?
6. Did the workers or any of them object to its introduction? If so,

  a. What class or classes of workers?
  b. To what extent?
  c. On what grounds, or from what causes?
  d. Were the objections of the workers considered? If so, in what manner?

7. Is it, in general, desirable or practicable for the workers to have any voice in determining whether or not the task and bonus system shall be introduced, or, after it is introduced, whether or not it shall be retained?
  a. If not, why not?
  b. If so,
    1. Which workers should have such a voice?
    2. How should the workers' choice be expressed?
    3. What considerations should be given to the workers' preference?
    4. How and by whom should a decision be reached?
    5. Should trade unions or trade union officials be allowed any voice in this matter?
  a. If not, why not?
  b. If so, what?

8. Is a basic or day wage established in connection with the task and bonus system in this shop, which is paid the workers who fail to make the task?
  a. If not, why not?
  b. If so, on what basis is it calculated?

9. How, by whom, and on what grounds was this day wage fixed or determined, for each class of work and workers?

10. Did the workers have any voice in this matter? If so, what?

11. Would it be desirable or practicable for the workers to have a voice in this matter?
  a. If not, why not?
  b. If so, how should it be expressed?

12. Would it be desirable or practicable to accept, as the basic or day wage in this connection, the standard rate or wage established by trade unions for the class of work in question? If not, why not?

13. Is it desirable or practicable to change the day wage after it has been established in connection with the task and bonus system?

- *a.* If not, why not?
- *b.* If so, should the workers have any voice in this matter, and, if any, what, and how should it be expressed?

14. Has the basic or day wage been changed or altered in any case in this establishment since the task and bonus system was introduced? If so, how, and by whom, and to what extent?
15. What considerations and circumstances might justify the changing of the base or day wage; would industrial depression and a fall in general wages constitute a justification?
16. By whom, and how, or on what grounds is the rate or wage to be paid for each task determined?
17. Have the workers any voice in this matter, and if so, how is it expressed?
18. When the task rate has been once established or fixed, is it ever changed or cut, raised or lowered?
    - *a.* If not, why not?
    - *b.* If so, by whose authority, why, and on what grounds?
    - *c.* Have the workers any voice in this matter? If so, what workers, and how is it expressed? Are they consulted?
19. To what extent, if any, have the task rates actually been changed in this establishment, and for what reasons?
20. What considerations and circumstances might justify the changing of the task rates?
21. Where the task has been once fixed, is it ever changed?
    - *a.* If not, why not?
    - *b.* If so, by whose authority, and why, and on what grounds?
    - *c.* Have the workers any voice in the matter? If so, what workers, and how is it expressed? Are they consulted?
22. To what extent, if any, have the tasks actually been changed in this establishment after being once fixed? How? For what reasons?
23. What considerations might justify the changing of the tasks?
24. What is the extent or amount of the bonus allowed for each class of work and worker?

25. What factors are considered in determining the bonus rate in each case; just how is the actual rate in each case determined?
26. Just how is the bonus calculated?
    a. General statement.
    b. Concrete illustration.
27. Are the bonus payments to be given calculated on the basis of the output of the worker for the hour or day, or on the basis of a longer period? If so, for what period, and why?
28. Is it possible to establish a just bonus rate for each class of work? If so, how is the just rate to be arrived at or determined; what is the proof of its justice?
29. When a worker on a given class or piece of work is found to be making the task which will secure the bonus, is he ever shifted to another task within the period for which the bonus payment is habitually calculated? If so, for what reasons?
30. Is a worker ever placed on a class or piece of work in which his efficiency is known or suspected to be less than on the work in which he was previously engaged? If so, for what reasons?
31. What entitles a worker to a bonus?
    a. What factors are considered?
    b. What facts and conditions demanded?
32. What deprives a worker of a bonus?
    a. What factors are considered?
    b. What facts and conditions determine?
33. Who determines the extent of the bonus, and whether or not it shall be awarded?
34. Have the workers any voice in these matters?
    a. If so, how is it expressed?
    b. If not, why not?
    c. What consideration is given to it?
35. When the bonus for a task has been once fixed, is it ever changed?
    a. If not, why not?
    b. If so, by whose authority, why, and on what ground is it changed?
    c. Have the workers any voice in this matter? If so,

what workers, and how is it expressed? Are they consulted?

36. To what extent, if any, have the bonus rates actually been changed in this establishment after being once fixed, and for what reasons?

37. What considerations and circumstances might justify the changing of the bonus rates?

38. When the task and bonus system was introduced, was there any conscious effort to secure a select class of workers?

39. If so, by what processes were new workers selected, old workers eliminated? What considerations governed? What tests were made?

40. Do the workers now under task and bonus represent a select class of higher quality as respects age, sex, initial health, initial training and ability superior to the old workers doing the same work?

41. Since the task and bonus was introduced into this establishment, what proportion of applicants for work has been hired? How does this compare with the situation before task and bonus was introduced? Explain.

42. Since the task and bonus system was introduced into this establishment, what number and proportion of workers newly hired have failed to make good?

43. When task and bonus was introduced in each class of work in this establishment:
    - *a*. What number and proportion of the workers who had been doing the work were rejected or dropped out of their particular work immediately, and for what reasons?
    - *b*. What number and proportion were rejected or dropped out of their work within
        1. One month, and for what reasons?
        2. Three months, and for what reasons?
        3. One year, and for what reasons?
    - *c*. What number and proportion of the workers who remained in the particular work, in each case, attained the task habitually?
        1. Immediately.
        2. Within three weeks.

    3. Within three months.
    4. Within six months.
    5. Within one year.
    6. Finally.
  d. How long, on the average, did it take the workers who remained in each class of work to reach the point where they made the task habitually?
  e. What number and proportion of the workers in each class of work exceeded the task?
    1. Within three weeks.
    2. Within three months.
    3. Within six months.
    4. Within one year.
  f. What number and proportion of the workers who remained at the particular work in each class exceeded the task habitually?
    1. Within three weeks.
    2. Within three months.
    3. Within six months.
    4. Within one year.
    5. Finally.

44. What proportion of the workers in each case or class of work fell to a lower standard after having attained the rate habitually?

45. What became of the workers who were rejected or dropped out when the task and bonus was introduced, and during its operation?
  a. Were efforts made to retain them? If so, what?
  b. To what extent were they given work elsewhere in this establishment?
  c. How did the wages of those given work elsewhere in this establishment compare with their former wages?
  d. What became of those who were not retained in this establishment?

46. What was the average number of workers in each case or class of work after the task and bonus system was introduced as compared with the number previously?
  a. During the six months preceding the introduction of task and bonus.

b. During the six weeks succeeding the introduction of task and bonus.

c. At present. How are these changes to be explained?

47. What instruction and assistance are provided for the workers when and after the task and bonus is introduced?

a. Who are the instructors, and what is their proportion to the workers?

b. How and by whom are these instructors selected?

c. What are the qualifications required for these instructors?

d. What are their functions? Are they expected to give frequent and minute instructions?

e. What is the kind and extent of the instruction?

f. What is the method and purpose of the instruction?

g. On what occasions is instruction given, and how does the worker go about to receive it?

48. What is the nature of the instruction card used under the task and bonus system?

a. General description.

b. Concrete examples or samples.

c. By what process do the workers secure the instruction cards?

49. Is the worker ever allowed to depart from the instructions given on these cards—to invent new methods of his own? If so, how? Is the worker allowed or encouraged to make suggestions in regard to changes in instructions and methods?

a. If not, why not?

b. If so, how?

50. What is the degree of punctuality, regularity and continuity of the workers under task and bonus, as compared

a. With the same workers before task and bonus was introduced?

b. As compared with the workers not under task and bonus?

51. What is the degree of variation of output from day to day, and week to week, of the individual workers under task and bonus, as compared

a. With the same workers before task and bonus was introduced?

b. As compared with the workers not under task and bonus?

52. What is the amount of delay between tasks or jobs during the day, under the task and bonus system, or the amount of time when there is no work for the operator?

a. As compared with the situation before the introduction of task and bonus?

b. As compared with the workers not under task and bonus?

53. What is the amount of the basic or day wage in each class of work under the task and bonus system?

54. What were the minimum, average and maximum earnings of the workers in each class of work before the introduction of the task and bonus system?

55. What are the earnings in each class of work where the workers just make the task and no more?

56. What have been the minimum and maximum earnings in each class of work under task and bonus

a. Within the past six months?

b. Within any other period?

57. In case there is no work for part of the day on the particular task on which the worker is engaged

a. Is he set at other tasks?

b. If not, is he paid for this idle time? If so, at what rate?

c. Does he lose his bonus?

58. What have been the actual average earnings, in each class of work, of the workers under task and bonus

a. Within the past six months?

b. Within any other period?

59. What have been the average earnings, in each class of work, of the workers who exceed the task

a. Within the past six months?

b. Within any other period?

60. Is any maximum limit put upon the earnings of the workers under the task and bonus system?

61. What system of inspection is used in connection with the task and bonus system?

62. Has the minuteness of inspection necessary to secure standard product increased or decreased since the introduction of task and bonus, and to what extent?

63. What has been the quality of the work turned out since task and bonus was introduced, as compared with
   a. The same work and workers before its introduction?
   b. The sections of the shop not under task and bonus?

64. How does the quantity of work turned out where the task and bonus system is in vogue, compare with the same sections of the shop before task and bonus was introduced? Give percentage result, and reasons for your answer.

65. How has the introduction of the task and bonus system affected the cost of the product?
   a. The labor cost per unit?
   b. The final cost per unit?

66. Do the workers under task and bonus show any evidence of overspeeding, overfatigue, or nervous and physical exhaustion
   a. Positively?
   b. As compared with the workers not under task and bonus?

67. Have the character, quality, sex and age of the workers changed where the task and bonus system has been introduced? If so, how and why?

68. What has been the effect of task and bonus upon the spirit of the shop?
   a. Upon the attitude of the workers toward their work?
   b. Upon the attitude of the workers toward the management?
   c. Upon the attitude of the workers toward their fellows in the group and shop?

69. Are the workers under task and bonus in this establishment generally satisfied with the system?
   a. If so, why do they like it?
   b. If not, what do they complain of in connection with it?

70. Do the workers in this establishment seek to come under the task and bonus system?
   a. If so, why?
   b. If not, why not?

71. Do the workers in the establishment prefer the task and bonus to any other system?
    a. If so, how do they show it?
    b. If not, what system do they prefer and why?
72. What has been the effect of the introduction of the task and bonus system upon the attitude of the workers toward trade unionism? Or how do they regard it?
73. Does the employer derive an advantage under the task and bonus system when the worker almost but does not quite make the task?
    a. If so, what?
    b. If not, why not?
74. Does the task and bonus system tend to guarantee against arbitrary rate cutting and the arbitrary alteration of the task? If so, how?
75. Is the task and bonus system of payment necessary in order that each worker should be paid in exact proportion to his efficiency? If so, why?
76. Is the task and bonus system necessary to secure reasonable or the highest efficiency? If so, in what classes of work and for what classes of workers and why?
77. Under the task and bonus system after it has been well established how many less workers does it take in the different classes of work, on the average, to do a job or to turn out a given amount of product than formerly, i.e., what are the proportions before and after?

SCHEDULE IV-C

The Premium System

1. When and by whom was the premium system installed in this establishment? What system or systems of work and pay did it displace?
2. For what classes of work is it employed, and what are the numbers, proportions, and sex of the workers in the establishment operating under it?
3. What were the considerations which led to its adoption, and why was it adopted?

4. By whose authority was it introduced?
5. Did the workers have any voice in determining whether it should be introduced or not? If so, what?
6. Did the workers or any of them object to its introduction? If so,
    - *a.* What class or classes of workers?
    - *b.* To what extent?
    - *c.* On what grounds, or from what causes?
    - *d.* Were the objections of the workers considered? If so, in what manner?
7. Is it, in general, desirable or practicable for the workers to have any voice in determining whether or not the premium system shall be introduced, or, after it is introduced, whether or not it shall be retained?
    - *a.* If not, why not?
    - *b.* If so,
        1. Which workers should have such a voice?
        2. How should the workers' choice be expressed?
        3. What consideration should be given to the workers' preference?
        4. How and by whom should a decision be reached?
        5. Should trade unions or trade union officials be allowed any voice in this matter?
            - a. If not, why not?
            - b. If so, what?
8. Is a basic or day wage established in connection with the premium system in this establishment, which is paid the workers who fail to attain the efficiency required in order that they shall receive premium payments?
    - *a.* If so, on what basis is it calculated?
    - *b.* How, by whom, and on what grounds was this basic or day wage fixed or determined for each class of work and workers?
    - *c.* Did the workers have any voice in this matter? If so, what?
    - *d.* Would it be desirable or practicable for the workers to have a voice in this matter?
        1. If not, why not?
        2. If so, what, and how should it be expressed?
    - *e.* Would it be desirable or practicable to accept, as the

basic or day wage in this connection, the standard rate or wage established by trade unions for the class of work in question? If not, why not?

f. Is it desirable or practicable to change the basic or day wage after it has once been established in connection with the premium system?

1. If not, why not?
2. If so, should the workers have any voice in this matter, and, if any, what, and how should it be expressed?

g. Has the basic or day wage been changed or altered in any case in this establishment since the premium system was introduced? If so, how, and by whom, and to what extent?

h. What considerations might justify the changing of the basic or day wage; would industrial depression and a fall in general wages constitute a justification?

9. By whom, and how, or on what grounds are the premium rates to be paid for each class of work and for each grade of efficiency determined?

10. Have the workers any voice in this matter?

a. If not, why not?

b. If so, how is it expressed, and what consideration is given to it?

11. At what percentage of efficiency do the premium payments begin?

12. What is the scale of the premiums allowed for each class of work and workers?

13. What considerations determine the fixing of the scale of premiums?

14. What factors are considered in determining the scale of premiums coördinated with the efficiency scale in each case, i.e., at what percentage of efficiency the premium shall begin, and the premium that shall be attached to each percentage of efficiency; just how are these matters determined?

15. Is the premium calculated by the hour, the day or over some longer period? If so, what? On what grounds is the period of calculation fixed? If for a period longer than the day, why?

16. Just how are the premium payments calculated?
    a. General statement.
    b. Concrete illustration.
17. When a worker on a given class or piece of work is found to be attaining the efficiency necessary to secure the premium payment, is he ever shifted to another class of work within the period for which premium payments are habitually calculated? If so, for what reasons?
18. Is a worker ever placed upon a class or piece of work on which his efficiency is known or suspected to be less than on the work in which he was previously engaged? If so, for what reasons?
19. What entitles a worker to a premium?
    a. What factors are considered?
    b. What facts and conditions demanded?
20. What deprives a worker of a premium payment?
    a. What factors are considered?
    b. What facts and conditions determine?
21. Who determines whether or not the premium shall be awarded?
22. Have the workers any voice in these matters?
    a. If so, how is it expressed?
    b. What consideration is given to it?
23. When the premium rates and scale for a class of work have been once fixed, are they ever changed?
    a. If not, why not?
    b. If so, by whose authority, why, and on what grounds?
    c. Have the workers any voice in this matter? If so, what workers, and how is it expressed? Are they consulted?
24. To what extent, if any, have the premium rates actually been changed in this establishment after having once been fixed, and for what reasons?
25. What considerations might justify the changing of the premium rate?
26. When the premium system was introduced, was there any conscious effort to secure a select class of workers?
27. If so, by what process were new workers selected, and old workers eliminated? What considerations governed? What tests were made?

28. Do the workers now under the premium system represent a select class of higher skill with respect to sex, age, initial health, initial training, and ability superior to the old workers doing the same work?

29. Since the premium system was introduced in this establishment, what proportion of applicants for work have been hired? How does this compare with the situation before the premium system was introduced?

30. Since the premium system was introduced in this establishment, what number and proportion of newly hired workers have made good?

31. When the premium system was introduced in each class of work in this establishment,
    - *a.* What number and proportion of the workers who had been doing the work were rejected or dropped out of this particular work immediately, and for what reasons?
    - *b.* What number and proportion were rejected or dropped out of this work within
        1. One month, and for what reasons?
        2. Three months, and for what reasons?
        3. One year, and for what reasons?
    - *c.* What number and proportion of the workers who remained in the particular work, in each case, attained the efficiency necessary to secure the premium habitually?
        1. Immediately.
        2. Within three weeks.
        3. Within three months.
        4. Within six months.
        5. Within one year.
        6. Finally.
    - *d.* How long, on the average, did it take the workers who remained in each class of work to reach the point where they secured the premium habitually?
    - *e.* What number of the workers in each class of work exceeded the efficiency necessary to secure the premium payment?
        1. Within three weeks.
        2. Within three months.

   3. Within six months.
   4. Within one year.

f. What number and proportion of the workers who remained at the particular work in each class exceeded the efficiency necessary to secure a premium habitually?

   1. Within three weeks.
   2. Within three months.
   3. Within six months.
   4. Within one year.
   5. Finally.

32. What proportion of the workers in each case or class of work fall to a lower standard of efficiency after having habitually attained the efficiency necessary to secure a premium payment?

33. What became of the workers who were rejected or dropped out when the premium system was introduced, and during its operation?

a. Were efforts made to retain them? If so, what?

b. To what extent were they given work elsewhere in the same establishment?

c. How did the wages of those given work elsewhere in this establishment compare with their former wages?

d. What became of those who were not retained in this establishment?

34. What was the average number of workers in each case or class of work after the premium system was introduced as compared with the number previously?

a. During the six months preceding the introduction of the premium system.

b. During the six months succeeding the introduction of the premium system.

c. At present.

d. How are these changes to be explained?

35. What instruction and assistance are provided for the workers when and after the premium system is introduced?

a. Who are the instructors, and what is their proportion to the workers?

b. How and by whom are these instructors selected?

c. What are the qualifications required for these instructors?

d. What are their functions? Are they expected to give frequent and minute instructions?

36. What is the nature of the instruction card used under the premium system?

a. General description.

b. Concrete example or sample.

37. By what process does the worker secure the instruction card?

38. Are the workers ever allowed to depart from the instructions given, to invent and use methods of their own? If so, how?

39. Is the worker allowed or encouraged to make suggestions in regard to changes in the instructions and methods?

a. If so, how?

b. If not, why not?

40. What is the degree of punctuality and regularity and continuity of the workers under the premium system, as compared

a. With the same workers before the premium system was introduced?

b. As compared with the workers not under the premium system?

41. What is the degree of variation of output from day to day, and from week to week, of the individual workers under the premium system, as compared

a. With the same workers before the premium system was introduced?

b. As compared with the workers not under the premium system?

42. What is the amount of delay between assigned pieces of work during the day under the premium system, i.e., the amount of time when there is no work for the operator to do?

a. As compared with the system before the introduction of the premium system?

b. As compared with the workers not under the premium system?

43. In case there is no work for part of the day, on the par-

ticular class of work on which a man is engaged in this establishment?

a. Is he set at other kinds of work?

b. If not, is he paid for the idle time? If so, at what rate?

c. Does he lose his premium?

44. What is the amount of the basic or day wage in each class of work under the premium system?

45. What were the minimum, average, and maximum earnings of the workers in each class of work before the introduction of the premium system?

46. What are the earnings in each class of work when the workers just reach the efficiency necessary to secure the premium?

47. What have been the minimum and maximum efficiency and earnings in each class of work under the premium system

a. Within the past six months?

b. Within any other period?

48. What have been the actual average efficiency and earnings in each class of work of the workers under the premium system

a. Within the past six months?

b. Within any other period?

49. What have been the average efficiency and earnings in each class of work of the workers who exceeded the efficiency necessary to secure a premium

a. Within the past six months?

b. Within any other period?

50. Is any maximum limit put upon the earnings of the workers under the premium system?

51. Have any workers under the premium system received earnings to any amount less than the basic or day wage for the class of work in question? If so,

a. How much less?

b. What number and proportion of workers?

c. What has become of these men?

    1. Have they been discharged?
    2. Has other work in this establishment been found for them where they have been unable to at-

tain an efficiency necessary to secure the basic wage or a premium?

52. What system of inspection is used in connection with the premium system in this establishment?

53. Has the minuteness of inspection necessary to secure standard product increased or decreased since the introduction of the premium system, and to what extent?

54. What has been the quality of the work turned out since the premium system was introduced, as compared with
    - *a.* The same work and workers before its introduction?
    - *b.* The sections of the establishment not under the premium system?

55. How does the quantity of work turned out where the premium system is in vogue compare with the same sections of the establishment before the premium system was established? Give percentages, and reasons for your answer.

56. How has the introduction of the premium system affected the costs of the product?
    - *a.* The labor cost per unit.
    - *b.* The final cost per unit.

57. Do the workers under the premium system show any evidence of overspeeding, overfatigue, or nervous or physical exhaustion?
    - *a.* Positively.
    - *b.* As compared with the workers not under the premium system.

58. Have the character, quality, sex and age of the workers changed where the premium system has been introduced? If so, how and why?

59. What has been the effect of the premium system upon the spirit of the shop?
    - *a.* Upon the attitude of the workers toward their work?
    - *b.* Upon the attitude of the workers toward the management?
    - *c.* Upon the attitude of the workers toward their fellows in the group or shop?

60. Are the workers under the premium system in this establishment generally satisfied with the system?

a. If so, why do they like it?

b. If not, what do they complain of in connection with it?

61. Do the workers in this establishment seek to come under the premium system?

a. If so, why?

b. If not, why not?

62. Do the workers in this establishment prefer the premium system to any other system?

a. If so, how do they show it?

b. If not, what system do they prefer and why?

63. What has been the effect of the introduction of the premium system upon the attitude of the workers toward trade unionism? How do they regard it?

64. Under the premium system, after it has been well established, how many less workers does it take in the different classes of work as an average to do a job or turn out a given amount of product than formerly, i.e., what are the proportions before and after?

65. Is the premium system of payment necessary for securing reasonable or the highest efficiency? If so, for what classes of work and for what kinds of workers, and why?

66. Is the premium system of payment necessary in order that each workman should be paid in exact proportion to his efficiency? If so, why?

67. Is it possible to establish a just premium scale for each class of work?

a. If so, how is the just scale to be arrived at or determined?

b. What is the proof of its justice?

68. Does the employer derive an advantage under the premium system when the worker almost but not quite makes the percentage of efficiency necessary to secure a premium payment?

a. If so, what?

b. If not, why not?

69. Does the premium system tend to guarantee against arbitrary rate cutting? If so, how?

SCHEDULE IV-D

THE PIECE-RATE SYSTEM

1. What is the attitude of the management of this plant toward piece work as compared with day work?
2. Does scientific management and especially elementary time study and task setting create opportunities for the substitution of piece work where day work existed before?
3. Is piece work more conducive to efficiency and more economical than day work?
   a. If so, why? On what classes of work, under what circumstances?
   b. If not, why not?
4. Does piece work as practiced in this plant lead the worker to drive himself? If so, do you attempt to control this in any way? If not, why not?
5. Does a piece-work system net the worker higher wages than day work?
6. Do the systems of payment employed by scientific management require piece work or tend to further its use?
7. When and by whom was the piece-rate system installed in this establishment?
   a. What system or systems of pay did it displace?
8. For what classes of work is it employed, and what are the number, proportion, and sex of the workers in the establishment operating under it?
9. What were the considerations which led to its adoption and why was it adopted?
10. By whose authority was it introduced?
11. Did the workers have any voice in determining whether it should be introduced or not?
    a. If so, what?
12. Did the workers or any of them object to its introduction? If so,
    a. What class or classes of workers?
    b. To what extent?
    c. Upon what grounds or from what causes?

d. Were the objections of the workers considered? If so, in what manner?

13. Is it in general desirable or practicable for the workers to have any voice in determining whether or not the piece-rate system shall be introduced or after it is introduced whether or not it shall be retained?
    a. If not, why not?
    b. If so, why?
        1. Which workers should have such a voice?
        2. How should the workers' choice be expressed?
        3. What consideration should be given to the workers' preference?
        4. How and by whom should a decision be reached?
        5. Should trade unions or trade union officials be allowed any voice in this matter?
    a. If not, why not?
    b. If so, what?

14. Is a day wage or basic wage of any kind established with the piece-rate system in this shop, which is paid regardless of piece-rate earnings? If so,
    a. How and by whom and on what grounds was this basic wage fixed for each class of work and workers?
    b. Did the workers have any voice in this matter? If so, what?
    c. Would it be desirable or practicable for the workers to have a voice in this matter?
        1. If not, why not?
        2. If so, why? And how should it be expressed?
    d. Would it be desirable or practicable to accept as the basic wage in this connection the standard rate or wage established by trade unions for the class of work in question? If not, why not?
    e. Is it desirable or practicable to change the day rate after it has once been established in connection with the piece-rate system?
        1. If not, why not?
        2. If so, should the workers have any voice in this matter, and, if any, what? And how should it be expressed?

Has the basic or day wage been changed or altered in

any case in this establishment since the piece-rate system was introduced?
    a. If so, how, by whom and to what extent?
  g. What considerations and circumstances might justify the changing of basic or day wage; would industrial depression and fall in general wages constitute a justification?

15. How, by whom and on what ground is the rate to be paid for each piece or lot determined?
16. Have the workers any voice in this matter? If so, how is it expressed? What consideration is given to it?
17. When a piece rate has once been established or fixed, is it ever changed or cut, raised or lowered?
    - *a.* If not, why not?
    - *b.* If so, by whose authority, why and on what grounds?
    - *c.* Have the workers any voice in this matter?
        1. If so, what workers and how is it expressed?
        2. Are they consulted?
18. To what extent, if any, have the piece rates actually been changed in this establishment, and for what reasons?
19. What considerations and circumstances might justify the changing of the piece rates?
20. Where the number of units per lot has once been fixed is it ever changed?
    - *a.* If not, why not?
    - *b.* If so, by whose authority, why, and on what grounds?
    - *c.* Have the workers any voice in this matter?
        1. If so, what workers and how is it expressed?
        2. Are they consulted?
21. To what extent, if any, have the number of units per lot been actually changed in this establishment after being once fixed? For what reasons?
22. What considerations might justify the changing of the number of units per lot?
23. What are the actual piece rates on the different classes of work under this system paid in this establishment?
24. What considerations determine the fixing of the actual piece rates?
    - *a.* Have the workers any voice in this matter? If so, how is it expressed, what consideration is given to it?

25. When the piece-rate system was introduced, was there any conscious effort to secure a select class of workers?
26. If so, by what process were the new workers selected, and the old workers eliminated?
27. What considerations governed and what tests were made?
28. Do the workers now under the piece rate represent a select class of higher quality as respects age, sex, initial health, initial training and ability superior to the old workers doing the same work?
29. When the piece-rate system was introduced in each class of work in this establishment,
    - *a.* What number and proportion of the workers who had been doing the work were rejected or dropped out of their particular work immediately, and for what reasons?
    - *b.* What number and proportion were dropped out of their work within
        1. One month and for what reason?
        2. Three months and for what reason?
        3. One year and for what reason?
    - *c.* What number and proportion of the workers who remained in the particular work habitually attained under the new system equal or greater earnings than under the old system?
        1. Immediately.
        2. Within three months.
        3. Within six months.
        4. Within one year.
        5. Finally.
    - *d.* What number and proportion of the workers who remained at the particular work in each class under the new system found it impossible to gain as great earnings under the new system as under the old?
30. What became of the workers who were rejected or dropped out when the piece-rate system was introduced and during its operation?
    - *a.* Were efforts made to retain them? If so, what?
    - *b.* To what extent were they given work elsewhere in this establishment?

c. How did the wages of those given work elsewhere in this establishment compare with their former wages?

d. What became of those not retained?

31. What was the average number of workers in each case or class of work after the piece-rate system was introduced as compared with the number previously?

a. During the six months preceding the introduction of the piece rate.

b. During the six months succeeding the introduction of the piece rate.

c. At present.

d. How are these changes to be explained?

32. What instruction and assistance are provided for the workers when and after the piece-rate system is introduced?

a. Who are the instructors and what is their proportion to the workers?

b. How and by whom are these instructors selected?

c. What are the qualifications required of these instructors?

d. What are the character, minuteness and extent of the instruction actually given?

33. What is the nature of the instruction card used under the piece-rate system?

a. General description.

b. Concrete example.

c. By what process does the worker secure the instruction card?

34. Is the worker ever allowed to depart from the instructions given on these cards, to invent and use methods of his own?

35. Is the worker allowed and encouraged to make suggestions in regard to instructions and methods?

a. If not, why not?

b. If so, how?

36. What is the degree of punctuality, regularity and continuity of the workers under the piece-rate system as compared

a. With the same workers before the piece-rate system was introduced?

b. As compared with workers not under the piece-rate system?

37. What is the degree of variation of output from day to day and from week to week of the individual workers and of the group of workers under the piece-rate system, as compared
    - *a.* With the same workers before the piece-rate system was introduced?
    - *b.* As compared with the workers not under the piece-rate system?
38. What is the amount of delay between jobs under the piece-rate system, i.e., the amount of time when there is no work for the operator,
    - *a.* As compared with the situation before the introduction of the piece-rate system?
    - *b.* As compared with the workers not under the piece-rate system?
39. In case there is no work for the day or for part of the day of the particular kind on which the worker is engaged,
    - *a.* Is he set at other tasks?
    - *b.* Is he paid for this idle time? If so, on what basis?
40. What were the average earnings of the workers in each class of work before the introduction of the piece-rate system?
41. What were the average, maximum and minimum earnings of the workers in each class after the introduction of the piece-rate system
    - *a.* During the past six months?
    - *b.* Within any other period?
42. Have any of the workers under the piece-rate system earned less than the customary wage for the class of work in question in this region?
    - *a.* If so, what have been their number and proportion in each class of work?
    - *b.* What has been the amount of time during which they received these lower earnings compared with the time of their service?
    - *c.* What has been the policy toward such workers?
        1. Have they been discharged, and, if so, after how long a period?
        2. Has any effort been made to place them in other lines where they could make average earnings

and, if so, what has been the success attending these efforts?

43. Is any maximum limit put on earnings under the piece-rate system?

44. What is the system of inspection used in connection with the piece-rate system?

45. Has the minuteness of inspection necessary to secure standard product increased or decreased since the introduction of the piece-rate system and to what extent?

46. What has been the quality of the work turned out since the introduction of the piece-rate system as compared with
   - *a.* The same work and workers before its introduction?
   - *b.* The sections of this establishment not under the piece-rate system?

47. How does the quantity of work turned out where the piece-rate system is established compare with that in the same sections before the piece rate was established?

48. How has the introduction of the piece-rate system affected the cost of the product?
   - *a.* The labor cost per unit.
   - *b.* The final cost per unit.

49. Do the workers under the piece-rate system show any evidence of overspeeding, overfatigue or nervous and physical exhaustion?
   - *a.* Positively.
   - *b.* As compared with workers not under the piece-rate system.

50. What has been the effect of the piece-rate system upon the spirit of the shop?
   - *a.* Upon the attitude of the workers toward their work?
   - *b.* Upon the attitude of the workers toward the management?
   - *c.* Upon the attitude of the workers toward their fellows in group and shop?

51. Are the workers under the piece-rate system in this establishment generally satisfied with the system?
   - *a.* If so, why do they like it?
   - *b.* If not, of what do they complain and to what do they object in connection with it?

52. Do the workers in this establishment seek to come under the piece-rate system?
    a. If so, why?
    b. If not, why not?

53. Do the workers here prefer the piece-rate system to any other system?
    a. If so, how do they show it?
    b. If not, what system do they prefer and why?

54. What has been the effect of the introduction of the piece-work system upon the attitude of the workers toward trade unionism? How do they regard it?

55. Are piece rates necessary to secure reasonable or highest efficiency?
    a. If so, what kinds of work and in the cases of what kinds of workers and why?

56. Is the piece-rate system necessary in order that each worker should be paid in exact proportion to his efficiency?

57. Is it possible to establish a just piece rate for each class of work?
    a. If so, how is the just rate to be arrived at or determined? What is the proof of its justice?

58. Under the piece-rate system, after it has been well established, how many less workers does it take in the different classes of work, on the average, to do a job or turn out a given amount of product than formerly, i.e., what are the proportions before and after?

59. When task and bonus have been substituted for the piece rate are the workers healthier and more at ease or are they pushed?

SCHEDULE V

HIRING, DISCHARGE, DISCIPLINE, SECURITY AND CONTINUITY OF EMPLOYMENT

1. By whose authority are workers hired for this establishment?

2. Have the wage-working employees of this establishment any voice in this matter of hiring workers? If so, what?

3. Should the wage-working employees of this establishment have any voice in the matter of hiring workers, especially with respect to the age, sex, nationality, character, habits, training and skill, industrial affiliations, and numbers of the prospective workmen?
    - *a*. If so, what and why?
    - *b*. If not, why not?
4. Should the unions or the officials of the unions to which the wage-working employees of this establishment belong have any voice in these matters?
    - *a*. If so, what and why?
    - *b*. If not, why not?
5. By whom are the wage-workers actually hired in this establishment?
6. What is the main source of supply of the workers of this establishment? Is it local or non-local? If the latter, from what locality, city or country do the workers mainly come to the shop?
7. How are the candidates for jobs secured, and what factors are taken into consideration in determining whether a particular worker shall be hired or not, e.g., what inquiries are made, what qualities and qualifications are considered and demanded, what proofs are required, what tests are made?
    - *a*. General statement.
    - *b*. Description of the process connected with the hiring of workmen.
8. In securing workers for this establishment, is any use made of employment agencies of any kind? If so, what kind or kinds, and to what extent?
9. In hiring workers does the management give preference to skilled, semi-skilled, or unskilled workers? If so, why? Is there anything in the statement that the best results are secured from those who are taken unskilled, or semi-skilled, and trained in the shop from the beginning? If so, why?
10. In hiring, is any inquiry made in regard to the industrial affiliation of the prospective workers; in hiring, is any discrimination made in favor of or against union workers?

11. Who has the final authority in the matter of the discharge of wage-workers from this establishment?
12. Have the wage-workers, as a body, any voice in this matter?
    - *a.* If not, why not?
    - *b.* If so, what, and how is it exercised?
13. Should the wage-workers, as a body, have any voice in this matter of discharge?
    - *a.* If not, why not?
    - *b.* If so, what, and how should it be exercised?
14. Should the unions or the officials of the unions, to which the wage-working employees of this establishment belong, have any voice in the matter of discharge of employees?
    - *a.* If so, what and why?
    - *b.* If not, why not?
15. By whom are the wage-workers in this establishment actually discharged?
16. On what grounds are wage-workers discharged, or what constitute effective causes of discharge?
17. What is the actual process of discharge, e.g., where do complaints originate; to whom are they made, to whom transmitted; what, if any, investigation is made of complaints; how are they considered; how and on what grounds is the final decision reached?
    - *a.* General descriptive account.
    - *b.* Concrete illustration.
18. Have the workers of whom complaints are made any right of explanation, defense or appeal?
    - *a.* If not, why not?
    - *b.* If so, how is it exercised, and considered, i.e., to whom may they appeal, and what consideration is given to this appeal?
    - *c.* Is any definite machinery or process established for such appeals? If so, what?
19. In the matter of discharge, is any inquiry made in regard to the affiliations of the worker; is any discrimination made in favor of or against a union worker?
20. Is notice given to workers before discharge? If so, how long?

21. In making discharges, or cutting down the force, what consideration is given to the relative skill and wages of workers? Are skilled and high-wage workers ever discharged to make room for less skilled and lower-wage workers?
22. Are any records kept of the individual wage-workers in this establishment? If so,
    - *a.* What is the form of the record, and what items of information does it call for?
        1. General account.
        2. Concrete illustration.
    - *b.* For what purpose or purposes are these records kept?
    - *c.* What are the sources of this information?
    - *d.* Has the worker or have the workers any voice in determining what shall go into these records?
    - *e.* Is information contained in these records ever given to any other employer of labor or association of employers? If so, for what purposes?
    - *f.* Does the management attempt to keep this information from outsiders? Does it guarantee secrecy in this matter?
23. Have you a regular shop disciplinarian? If so, what are his powers and duties?
24. Has the management of this establishment installed any definite system or method of recording merit or demerit of workers? If so, what are its character and purposes and how does it operate?
25. What persons or officials have power and authority to discipline wage-workers in this establishment?
26. What is the disciplinary power or authority of each of these persons or officials?
27. Who has the final authority in the matter of discipline?
28. Have the workers, as individuals or as a body, any voice in determining the character of discipline, or the mode of exercising disciplinary authority?
    - *a.* If not, why not?
    - *b.* If so, what, and how is it exercised?
29. Should trade unions or the officials of trade unions, to which the workers in the establishment may belong, have any voice in the matter of discipline?

a. If not, why not?

b. If so, what, and how should it be exercised?

30. What are the punishable offenses in this establishment, and what are the actual and possible penalties attached to each?

31. Have the wage-workers any voice in this matter?
    a. If not, why not?
    b. If so, what, and how is it exercised?

32. What is the actual process by which discipline is measured out?
    a. General statement.
    b. Concrete illustration.

33. What instructions are given to shop foremen or assistant foremen in regard to the treatment of the workers?

34. What is the disciplinary power and activity of shop foremen or assistant foremen as compared with the situation
    a. Before scientific management was installed?
    b. As compared with this power or activity in the non-scientific management sections of the shop?

35. Are the workers fined or docked for breaches of discipline? If so,
    a. For what offenses?
    b. To what extent?

36. What is the method in this establishment of dealing with spoiled work and spoiled materials? How is the responsibility in such cases determined? What penalties are imposed on the workers responsible for spoiled work or materials?

37. What is the method in this establishment of dealing with machine and tool breakage or damage? How is the responsibility determined? What penalties are imposed on the workers responsible?

38. Has the establishment a distinct and separate employment, personnel or labor department? If so,
    a. When and for what purposes was it established?
    b. What is its personnel?
    c. What are its powers and duties?
    d. How does it exercise its functions?

39. What are the training and record of the head of the labor department?

40. Have the workers any voice in respect to the labor department? If so, what, and how is it exercised?

41. Should the workers have any voice in respect to the labor department?
    - *a.* If so, what, and how should it be exercised?
    - *b.* If not, why not?
    - *c.* Is this a proper place for trade union coöperation?

42. Have the workers in this establishment any complaints or proposals to make in regard to hiring, discharge and discipline?
    - *a.* If so, what?

43. What are the number and proportion of the workers in each class of work under scientific management, who have been hired
    - *a.* Within the past three months?
    - *b.* Within the past six months?
    - *c.* Within the past year?
    - *d.* Within the past two years?
    - *e.* Since scientific management was installed?

44. How does this record compare with the situation
    - *a.* Before scientific management was installed?
    - *b.* In the non-scientific management sections of the establishment?

45. What are the number and proportion of the workers in each class of work under scientific management who have been discharged
    - *a.* Within the past three months?
    - *b.* Within the past six months?
    - *c.* Within the past year?
    - *d.* Within the past two years?
    - *e.* Since scientific management was installed?

46. How does this record compare with the situation
    - *a.* Before scientific management was installed?
    - *b.* In the non-scientific management sections of the establishment?

47. What has been the average yearly turnover of labor, i. e., the percentage of the total workers in this establishment hired each year?
    - *a.* Since scientific management was installed?
    - *b.* Before scientific management was installed?

48. What have been the average number and proportion of cases of discipline, docking and fining, per month, in the different classes of work under scientific management,
    - *a.* As compared with the average number and proportion, in the same classes of work, before scientific management was installed?
    - *b.* As compared with the average number and proportion in the non-scientific management sections of the establishment?

49. Does the establishment employ workers in split shifts or the off-and-on system? If so, what have been the average number and proportion of workers in split-shifts
    - *a.* Since scientific management was installed, as compared with the time before it was installed?
    - *b.* In the scientific management sections of the shop as compared with the non-scientific management sections?

50. What have been the extreme variations in the number of workers employed
    - *a.* Since scientific management was installed, as compared with the time before it was installed?
    - *b.* In the scientific management sections of the establishment as compared with the non-scientific management sections?

51. What have been the average yearly number and proportion of part-time workers employed
    - *a.* In the establishment since scientific management was installed as compared with the time before it was installed?
    - *b.* In the scientific management sections of the establishment as compared with the non-scientific management sections?

52. What has been the average length of service of wage-working employees
    - *a.* Since scientific management was installed, as compared with the time before it was installed?
    - *b.* In the scientific management sections of the establishment, as compared with the non-scientific management sections?

53. What have been the relative sex proportions of wage-workers in this establishment
    a. In the different classes of work under scientific management as compared with the same classes of work before scientific management was installed?
    b. In the scientific management sections of the establishment, as compared with the non-scientific management sections?
54. What have been the number and proportion of wage-working employees above the ages of 30, 40, 50, and 60, respectively,
    a. In the different classes of work under scientific management, as compared with the same classes of work before scientific management was installed?
    b. In the scientific management sections of the establishment, as compared with the non-scientific management sections?
55. When scientific management was installed in this establishment, or in any section of it, were efficient and high-priced workers displaced for less efficient and lower-priced workers? If so, why?
56. When scientific management was installed, was the wage-working force cut down? If so, to what extent, and for what reasons? If not, why not?
57. What has been the average extent of the wage-working force since scientific management was installed as compared with the preceding year? How is this change to be explained?

SCHEDULE VI

VOCATIONAL SELECTION, SPECIALIZATION, STANDARDIZATION, INSTRUCTION AND TRAINING, ADVANCEMENT, PROMOTION AND DEMOTION OF WORKERS

1. By whom are workers assigned tasks or kinds of work, and shifted from one kind of work to another?
2. What is the process by which a worker is assigned to a particular line of work?

   a. General statement.
   b. Concrete illustration.

3. What facts or factors are taken into consideration in determining the kind of work to which a worker shall be assigned?
4. In making the assignment of work, what weight is given to the choice and inclination of the worker?
5. In making the assignment of work:
   a. Are any psychological tests of the worker made? If so, what?
   b. Are any physiological tests of the worker made? If so, what?
   c. Is the Blackford method used to any extent?
   d. Is the Schneider method used to any extent?
   e. Are any studies of fatigue made? If so, what?
   f. Are time and motion studies made in this connection?
6. Is the final assignment made mainly with reference to the physical and psychological characteristics of the worker, or is it worked out mainly by "trial and error"?
7. What is the final standard of judgment as to the validity of work assignment? If the worker "makes good" at the work to which he is assigned, is this considered to be a final test of the matter? Is he then considered to be properly assigned?
8. What is the method of proof adopted in this establishment to show that a particular task is accomplishable under the conditions demanded? Can any particular worker demand that the proof be offered in his particular case? If not, why not? If so, how, and how is the demand treated?
9. Should the worker always be assigned to the line of work in which he shows the highest immediate efficiency?
   a. If so, why?
   b. If not, why not?
10. Is the worker usually quickly fitted into his proper line of work, or does the process of adaptation usually take considerable time?
11. In dividing the work into tasks or operations, is a high degree of specialization or division of labor aimed at?
12. How far should this specialization of operations or division

of labor be carried? Is there any rule or law which should govern this matter? If so, what?

13. In the different classes of work under scientific management in this establishment, is the specialization of tasks or operations greater or less than
    a. In the classes of work not under scientific management?
    b. In the same classes of work, before scientific management was installed?
14. Under scientific management, as carried on in this establishment, are the old distinct crafts and trades recognized and maintained, or are they broken up and obliterated, and the subordinate operations recombined into new mechanical sequences?
15. What is the law or principle governing mechanical sequence under scientific management, as practiced in this establishment?
16. Is it good economy for all of the workers to learn and perform more than one task or operation?
17. If not, what proportion of the workers in the different groups or classes can be thus taught with due consideration for economy?
18. Is it good economy for any of the workers to learn and perform all the operations of a given craft or trade as it at present exists in the industry, generally?
19. If so, what proportion of the workers of the different groups or classes can thus be taught with due consideration for economy?

NOTE.—The term *routing* in the following questions refers to workers, and means the systematic transfer of the worker from task to task or from kind of work to kind of work, with the idea of broadening his skill and industrial capacity.

20. To what extent is it economical to "route" the different workers of the different groups or classes
    a. With respect to the number of tasks or operations to be performed?
    b. With respect to the number and proportion of the workers in each group or class?
21. What are the main reasons for or against the routing of the workers?

22. To what extent are the workers of the different classes not routed or routed in this establishment:
a. Not routed:
1. What number and proportion of the workers in the different groups or classes have performed but a single task or operation?
2. What number and proportion of such workers in each group or class, who have performed but a single task or operation, have been in service
a. One year?
b. Two years?
c. Three years?
3. What is the maximum term of service of any such worker in this establishment?
4. Has the installation of scientific management affected the situation? If so, how?
b. Completely routed:
1. What have been the number and proportion of the workers in the different groups or classes who have learned and performed all the operations of a given craft or trade
a. Since scientific management was installed?
b. Before scientific management was installed?
c. How do the scientific management and the non-scientific management sections of the establishment compare in this respect?
2. How long has been the average term of service in connection with a single task or operation of the workers completely routed
a. Since scientific management was installed?
b. Before scientific management was installed?
c. How do the scientific management and the non-scientific management sections of the establishment compare in this respect?

c. Partially routed:
- 1. What have been the number and proportion of the workers in the different groups or classes who have performed a plurality of tasks or operations
    - a. Since scientific management was installed?
    - b. Before scientific management was installed?
    - c. How do the scientific management and the non-scientific management sections of the establishment compare in this respect?
- 2. What has been the average number of operations performed by the workers partially routed in each of the groups or classes in the establishment
    - a. Since scientific management was installed?
    - b. Before scientific management was installed?
    - c. How do the scientific management and the non-scientific management sections of the establishment compare in this respect?
- 3. How long has been the average term of service of the workers partially routed in connection with a single operation
    - a. Since scientific management was installed?
    - b. Before scientific management was installed?
    - c. How do the scientific management and the non-scientific management sections of the establishment compare in this respect?

23. Does or can scientific management through routing lessen the necessity for a shop reserve of workers?

24. Are time and motion study essential to the proper routing of the workers in the shop as well as of the jobs and material? If so, why?

25. What in your opinion does the term "apprenticeship" imply?

26. Does this establishment have a definitely outlined course of instruction and experience under which young workers are taught all of the knowledge and skill which would be expected of a first-class mechanic? If so, describe character of training and instruction given, and method of supervision of instructors in charge of the course.

27. In your opinion, is a systematic training of young men or women in all of the branches of a trade advisable under scientific management? If so, why? If not, why not?

28. Does the first-class mechanic, under scientific management, prove more efficient in this establishment than the unskilled workers who have been trained to perform the special class of work to which they are assigned?
    - *a.* If so, why?
    - *b.* If not, why not?

29. Are there any types of machine, or forms of production in this establishment which require the use of gangs or crews of workmen to work together?
    - *a.* If so, what?
    - *b.* What is the mode of payment of the gang?
    - *c.* How are the total earnings divided among the individuals composing the gang?
    - *d.* How is the speed of each individual composing the gang or crew regulated so that the highest efficiency of the group is secured?

30. In gang or crew production, is it advantageous to introduce the contest principle, stimulating one gang or crew to develop a higher degree of production than the other?
    - *a.* If so, why?
    - *b.* If not, why not?

31. Are the workers in this establishment in the different classes of work under scientific management actually more or less specialized in their work
    - *a.* Than the workers in the same classes of work before scientific management was installed?
    - *b.* Than the workers not under scientific management?

32. What would be your definition of
    a. A skilled craftsman?
    b. A skilled mechanic?
    c. An unskilled worker?
    d. A semi-skilled worker?
    e. A hand man?
33. Does the coming of the efficiency systems prove of particular advantage to the unskilled, semi-skilled and handy man, and to what extent?
34. What are the number and proportion in this establishment of skilled craftsmen, skilled mechanics, unskilled workers, semi-skilled workers, handy men?
    a. In the different classes of work under scientific management as compared with the classes of work not under scientific management?
    b. In the different classes of work under scientific management as compared with the same classes of work before scientific management was installed?
35. Do the advanced wage systems prove themselves particularly advantageous to a particularly skilled group, or are they of equal advantage to the general level of workers?
36. Are the workers under scientific management, in this establishment, given an opportunity to change their special tasks, operations or line of work when they so desire?
    a. If not, why not?
    b. If so, on what conditions, and under what circumstances?
37. How often are the workers thus allowed to change their special tasks or lines of work?
38. Are the workers encouraged or urged so to change the character of their work?
    a. If not, why not?
    b. If so, under what circumstances?
39. Does the average worker under scientific management, in this establishment, thus have the opportunity of learning a trade?
40. Does scientific management add to the worker's general ability
    a. As a worker for the particular job he is on?

b. As a possibility for other jobs?

c. As a citizen?

41. Is the mechanical ability of the average worker under scientific management, in this establishment, broader or narrower
    a. Than the average ability of the worker in this establishment not under scientific management?
    b. Than the average ability of the worker in this establishment before scientific management was installed?
    c. What are the proofs of these statements?
42. Just what is meant by the statement that scientific management eliminates pace setters? What is meant by pace setters and how are they eliminated in your establishment?
43. Just what is meant by "speeders" and just how does scientific management "turn speeders into instructors"?
44. Is there any limit put upon the speed, efficiency or output of individual workers in this establishment?
45. Does the management desire to have the workers exceed the task set?
    a. If so, to what extent?
    b. If not, why not?
46. How are foremen and assistant foremen and superintendents and assistant superintendents in this plant paid? Do they receive any remuneration in the form of premiums or bonuses? Does their pay depend at all upon anything connected with the work of the employees under them? If so, how?
47. How great is the incentive to foremen and assistant foremen to see that all workers under them make bonuses, and, if a bonus is paid for each successful worker under them, is a special bonus paid if all are successful?
48. What is the effect of this relation between the foreman, assistant foreman or gang boss and the workers under him upon his attitude towards and dealings with the workers?
49. Is there any guarantee that he will become a more effective instructor rather than a driver of the workmen? What has been your experience in this connection?
50. Are the modes of payment employed by scientific manage-

ment necessary for the elimination of the need for pace setters, and the turning of speeders into instructors? If so, why?

51. Are the modes of payment employed by scientific management necessary for the elimination of systematic soldiering? If so, why?
52. Is the speed of workers under scientific management set with reference to long-time effects upon the workers and long-time productive results? If so, what method is adopted for the determination of these effects?
53. Just what do you mean by standardization of performance? Does scientific management standardize performance?
54. Are the modes of payment employed by scientific management necessary to the standardization of performance? If so, why?
55. Who are the instructors of the workers in the scientific management departments of this establishment?
56. What are the number and proportion of the instructors to the workers in the scientific management sections of this establishment?
57. How were these instructors recruited?
58. Are instructors paid by the hour, day, week, or are they under annual salary? Do they receive any form of bonus, premium or other form of additional remuneration? If so, what and why?
59. What are the training and record of each of these instructors?
60. What is the character of the instruction given to the workers in this establishment, under scientific management? What does it include, specifically?
    a. General statement.
    b. Concrete illustration.
61. Is the main object of instruction to teach the worker how to produce more or how to produce more by simpler and better methods and with less effort? If the latter, what actual cases can be pointed to in this shop as proofs?
62. Do the workers have any voice in determining who their instructors shall be, in their selection?

   a. If not, why not?
   b. If so, what, and how is it exercised?

63. Do the workers have any voice in determining what and how much instruction they shall receive?
   a. If not, why not?
   b. If so, what, and how is it exercised?
64. Can and do the workers make complaints against the instructors?
   a. If not, why not?
   b. If so, to whom, how, and what consideration is given to these complaints?
65. Do the workers have any voice in determining whether instructors shall be retained or discharged?
   a. If not, why not?
   b. If so, what, and how is it exercised?
66. What, in general, are the relations between the instructors and workers?
   a. Are they cordial or strained?
   b. Do the workers look upon the instructors as helpers or drivers?
67. Do the modes of payment employed by scientific management promote the training of workmen? If so, how?
68. Are the workers at a task or operation held responsible for the work and discipline of helpers?
69. Are the more competent workers held responsible for the training and instruction of beginners?
70. What determines the amount of attention given to individual workers by instructors? Are there any general rules governing this?
71. What inducements, if any, are offered to the workers to make suggestions in regard to improvements in methods of work or new tools and processes?
72. Is any pressure brought to bear upon individuals in this establishment to bring out their best capacity and performance as to speed, efficiency and output?
73. Are special inducements ever held out to individuals of more than ordinary capacity and ambition in this establishment to make the most of themselves in the way of speed, efficiency and output?
74. What is meant under scientific management by

a. Advancement?
b. Promotion?
c. Demotion?

75. What are the grounds for advancement and promotion, respectively, of the workers under scientific management, in this establishment? Are seniority and "seniority rights" considered?

76. Have the workers under scientific management, in this establishment, any voice in the matter of advancement, promotion and demotion?
 a. If not, why not?
 b. If so, how is it exercised?

77. What have been the numbers and proportions of workers in the different classes of work in this establishment under scientific management advanced each year?

78. What has been the average increase of wages for workers, as the result of such advancement?

79. What have been the average yearly number and proportion of the workers in the different classes of work, under scientific management in this establishment, promoted each year:
 a. As compared with the workers not under scientific management?
 b. As compared with the situation before scientific management was installed?

80. What have been the average yearly numbers and proportions of the workers, under scientific management in this establishment, who have left the establishment to go to better, higher positions each year:
 a. As compared with the workers not under scientific management?
 b. As compared with the situation before scientific management was installed?

81. What are the proportions of skilled, semi-skilled, and unskilled workers in the different classes of work, under scientific management, in this establishment?
 a. As compared with the same classes of work before scientific management was installed.
 b. As compared with the workers in the sections of the establishment not under scientific management.

82. If it is proved that a task assigned in this establishment is not accomplishable by a particular worker, what action follows?

83. Are there any punishments or special disadvantages placed upon those workers in your plant who fall behind the speed and accomplishment of the group? If so, what?

84. Are workers who, after sufficient time, do not more or less regularly gain increased reward, kept in their old places, and by any method of encouragement or discrimination incited to greater effort?

85. It is a claim of scientific management that each worker is assigned to a definite accomplishable task. How is this end attained in this establishment? What is the proof that it is true in this establishment?

86. How in this establishment do you attempt to offset the common tendency for the exceptionally efficient worker to be held down to the pace of the crowd?

87. Does a system of immediate rewards tend to injure the character of the worker in that it diminishes his sense of responsibility for doing other work which must be done without immediate reward equally well?

88. What is the basis of judgment in this establishment as to what is a fair day's work and what is the method of arriving at the determination of a fair day's work in practice?

89. What, in your estimation, constitutes a good workman? What are the characteristics of a good workman in the matter of qualities, training, attitudes, habits and affiliations?

90. What, in your estimation, constitutes a good employer?

SCHEDULE VII-A

[Designed for Employers]

EFFECT ON CHARACTER AND RELATIONS OF THE WORKERS

1. What tests can be applied under scientific management to determine the character and degree of mechanical skill or craft possessed by workers?

2. Do these tests render unnecessary the element of personal judgment applied in selecting or promoting workmen in establishments where the methods of scientific management have not been introduced?
3. Is the same degree of craft or mechanical skill required of workmen under scientific management as in plants where scientific management is not applied?
   - *a.* If so, why?
   - *b.* If not, why not?
4. What has been the average percentage of punctuality of workers in the scientific management sections of this establishment?
   - *a.* As compared with the time before scientific management was installed?
   - *b.* As compared with the non-scientific management sections?
5. What has been the average percentage of time lost per worker on account of sickness and accident in the scientific management sections of the establishment?
   - *a.* As compared with the same sections before scientific management was installed?
   - *b.* As compared with the non-scientific management sections?
6. Do you believe that scientific management reduces or mitigates the monotony incident to modern machine industry?
   - *a.* What grounds have you for this belief?
   - *b.* What proofs can you supply from the labor experiences of this establishment?
   - *c.* Have you any special method or methods for mitigating the monotony of repetitive work? If so, what?
7. Do you believe that scientific management tends to develop the workers' sense of personal achievement?
   - *a.* What grounds have you for this belief?
   - *b.* What proofs can you supply from the labor experiences of this establishment?
8. Do you believe that scientific management puts interest, joy and zest into the workers' labor?
   - *a.* What grounds have you for this belief?

b. What proofs can you supply from the labor experiences of this establishment?

9. Do you believe that scientific management stimulates the workers' inventive genius?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
10. Do you believe that scientific management energizes the workers intellectually?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
11. Do you believe that scientific management promotes the workers' self-reliance, self-respect, individuality, personality and dignity?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
12. Do you believe that scientific management develops and broadens the workers' mechanical skill ?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
13. Do you believe that scientific management trains the workers in mechanical knowledge as they were never trained before?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
14. Do you believe that scientific management tends to induce habits of industry, temperance and saving on the part of workers, and tends to elevate them morally and socially?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
15. Do you believe that scientific management eliminates the suspicions of employers that the workmen are soldiering or gaining an unfair advantage?
    a. What grounds have you for this belief?

b. What proofs can you supply from the labor experiences of this establishment?

16. Do you believe that scientific management promotes friendly feeling between the management and the men?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
17. To what extent does scientific management prevent complaints against the management by the men?
    a. What proofs can you supply from the labor experiences of this establishment?
18. To what extent does scientific management eliminate suspicion of the management by the men?
    a. What proofs can you supply from the labor experiences of this establishment?
19. Do you believe that scientific management causes the workers to regard their employers as their best friends?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
20. Do you believe that scientific management makes the men in the shops more manly, truthful and straightforward?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
21. Do you believe that scientific management eliminates the hampering of the strong and willing by the weak and unwilling?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
22. Do you believe that scientific management prevents the more efficient workers from being held back and demoralized by the inefficient?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?
23. Do you believe that scientific management promotes friendly feeling and action among the workers of the

shop or group, makes the workers under scientific management more cheerful and helpful than under the previous forms of management?
  - *a.* What grounds have you for this belief?
  - *b.* What proofs can you supply from the labor experiences of this establishment?

24. Do you believe that scientific management sets each man to the highest task for which his physical and intellectual capacity fits him?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you supply from the labor experiences of this establishment?
25. Do you believe that scientific management opens the way for all workmen to become "first-class men" in some employment?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you supply from the labor experiences of this establishment?
26. Do you believe that scientific management insures just treatment of the individual worker?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you supply from the labor experiences of this establishment?
27. Do you believe that scientific management stimulates the thought and ambitions of the workers?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you supply from the labor experiences of this establishment?
28. To what extent is the continuous performance of simple and uniform tasks or operations distasteful to the workers or injurious to them mentally and physically?
29. Do you find workers who thrive on simple and uniform tasks? What grounds have you for your position? What proofs can you offer from the labor experiences of this establishment?
30. Are there in this establishment any methods in use for stimulating competition in skill or output between groups of workers or sections or departments of the shop? If so, what?

31. Do you believe that scientific management prevents the introduction or development of the "contest principle" among workmen?
    a. What grounds have you for this belief?
    b. What proofs can you supply from the labor experiences of this establishment?

32. What are the home and living conditions of the workers under scientific management as compared with the same classes of workers not under scientific management in this region? Have you any records to substantiate your answer?

33. Have the social habits of the workers under scientific management and their mode of spending their leisure time changed since they came under scientific management? If so, how?

34. What, if any, labor troubles, giving dates and periods, have occurred in this establishment while scientific management was being installed or since its installation?
    a. Did the workers in the scientific management sections of this establishment take any part in these troubles? If so, what?
    b. Did these workers actually go out on strike?
    c. What were the complaints of the workers? Did they touch directly the use of scientific management or any of its policies and methods? If so, what?
    d. In what manner were these difficulties settled?

SCHEDULE VII-B

[Designed for Employees]

EFFECT ON CHARACTER AND RELATIONS OF THE WORKERS

1. Do you believe that scientific management enables unskilled and underpaid workmen to compete with skilled workmen?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?

2. Do you believe that scientific management puts a premium on muscle and speed rather than on brain?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you present from your knowledge of labor experiences?
3. Do you believe that scientific management tends to deprive the worker of thought, judgment and initiative in connection with the work?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you present from your knowledge of labor experiences?
4. Do you believe that scientific management tends to minimize the acquired skill of the workers?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you present from your knowledge of labor experiences?
5. Do you believe that scientific management tends to destroy the craftsmanship and skill of the workers?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you present from your knowledge of labor experiences?
6. Do you believe that scientific management tends to deprive the workers of the opportunity of learning a trade?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you present from your knowledge of labor experiences?
7. Do you believe that scientific management deprives the worker of industrial and mechanical training?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you present from your knowledge of labor experiences?
8. Do you believe that scientific management reduces the worker to a semi-automatic attachment to the machine or tools?
    - *a.* What grounds have you for this belief?
    - *b.* What proofs can you present from your knowledge of labor experiences?
9. Do you believe that scientific management narrows the scope, increases the monotony of the work, and prac-

tically condemns the worker to a fixed monotonous routine?

a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

10. Do you believe that scientific management decreases the general and the long-time efficiency of the workers?
a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

11. Do you believe that scientific management narrows the industrial capacity of the worker?
a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

12. Do you believe that scientific management narrows the worker's field of industrial and competitive activity?
a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

13. Do you believe that scientific management deprives the worker of the hope of advancement?
a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

14. Do you believe that scientific management tends to destroy the individuality of the worker?
a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

15. Do you believe that scientific management tends to destroy the initiative of the worker?
a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

16. Do you believe that scientific management destroys the worker's joy and pride in his work?
a. What grounds have you for this belief?
b. What proofs can you present from your knowledge of labor experiences?

17. Do you believe that scientific management destroys the worker's sense of achievement?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?
18. Do you believe that scientific management tends to destroy the worker's independence?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?
19. Do you believe that scientific management tends to destroy the worker's dignity and manhood?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?
20. Do you believe that scientific management tends to destroy the worker's ambition?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?
21. Do you believe that scientific management tends to suppress and destroy the worker's inventive genius?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?
22. Do you believe that scientific management overstrains and overfatigues the workers nervously and physically?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?
23. Do you believe that scientific management represses and dwarfs the workers intellectually?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?
24. Do you believe that scientific management tends to undermine the worker's health, and bring premature old age upon the worker?
    a. What grounds have you for this belief?

b. What proofs can you present from your knowledge of labor experiences?

25. Do you believe that scientific management increases the danger of industrial accidents?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?

26. Do you believe that scientific management tends to create suspicion of the management in the minds of workers?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?

27. Do you believe that scientific management tends to develop suspicion of foremen in the minds of the workers?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?

28. Do you believe that scientific management tends to create mutual suspicion among workers?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?

29. Have there been any methods in use in this establishment for stimulating competition in skill or output between groups of workmen or sections or departments of the shop? If so, what and when?

30. Do you believe that scientific management introduces the "contest principle" among the workmen?
    a. What grounds have you for this belief?
    b. What proofs can you present from your knowledge of labor experiences?

31. Do you believe that the "contest principle" among workmen is advantageous
    a. To the employer?
    b. To the employee?
    c. Does it tend to improve the quality of the work?
    d. Does it tend to make inspection of work more accurate and painstaking?
    e. Does it tend to make each individual workman more ambitious? If so, why? If not, why not?

SCHEDULE VIII

COLLECTIVE BARGAINING AND TRADE UNIONISM

1. What is your understanding of the term "collective bargaining"?
2. Does collective bargaining imply that there are no underlying and guiding facts, natural laws or principles upon which both parties to the bargain are agreed? If so, why?
3. Can true industrial democracy exist apart from free agents entering into voluntary agreements?
4. Is, then, industrial democracy impossible where scientific facts and natural laws are concerned?
5. If there can be no collective bargaining where scientific facts and natural laws are concerned, can there be individual bargaining under such circumstances?
6. Is it possible to acquire sufficient scientific data to form a complete basis for the relations between two individuals?
   - *a.* To what extent, and in what fields has scientific management acquired these data? In other words, to what extent has the system of scientific fact and law, aimed at by scientific management, actually been worked out?
   - *b.* Has it been worked out sufficiently to safeguard absolutely the individual bargainer from injustice? If not, is there any present justification for the refusal to sanction collective bargaining on the ground that there can be no bargaining about scientific fact and natural law?
7. Does the management of this establishment, as a result of its experience, believe that the principles of scientific management are opposed to agreements with workers associated for that purpose? If so, why?
8. Does scientific management make collective bargaining unnecessary as a protection to the workers? If so, why?
9. Does scientific management make trade unionism and trade

union regulations unnecessary as a protection to the workers? If so, why?

10. Does the management believe that agreements with organized workers, covering the terms of employment, would interfere with or prevent the full development and application of scientific management in the plant? If so, why?
11. Does the management believe that agreements with organized workers would interfere with the form of discipline and methods of direction required under scientific management? If so, in what manner, and to what extent?
12. Are there any verbal or written agreements in this establishment relative to the terms of employment between the management and the employees?
    - *a.* Verbal.
    - *b.* Written.
    - *c.* If so, what period of time do they cover?
13. If agreements covering the terms of employment exist, with whom were they entered into?
    - *a.* With the employees as individuals?
    - *b.* With the employees as craft or trade groups?
    - *c.* With the employees by departments?
    - *d.* With the employees as a whole?
14. Has this establishment entered into any collective agreements with
    - *a.* Union or unions? If so,
        - 1. With what union or unions?
    - *b.* Just what circumstances led or determined the management to enter into the agreement or agreements?
    - *c.* Have the results been satisfactory or unsatisfactory to the management? How and why?
15. Were these agreements entered into as a result of conferences with the employees?
    - *a.* Were the employees members of an industrial organization or trade union?
    - *b.* If so, did officers of the local union, not employees, participate in the conferences which preceded the agreement?

  - *c*. Did officers of the national unions with which employees were affiliated, participate in such conferences?
  - *d*. Was the local trade union a party to the agreement?
  - *e*. Was the national union a party to the agreement?

16. Does the management believe that trade agreements, covering the terms of employment, can be entered into with employees acting collectively, with beneficial results to the management? If so, why? If not, why not?
17. Can such collective agreements be entered into with unorganized employees, with safety to the management?
    - *a*. If so, why?
    - *b*. If not, why not?
18. Can such collective agreements be entered into with organized employees, with safety to the management? If not, why not?
19. Can such collective agreements be entered into with safety, through the national union of the employees? If not, why not?
20. Can such collective agreements be entered into with safety through the national union of the employees? If not, why not?
21. If agreements with employees, covering the terms of employment, are advisable, which form is the most advantageous?
    - *a*. With employees as individuals? If so, why?
    - *b*. With employees by craft or trade groups? If so, why?
    - *c*. With employees by departments? If so, why?
    - *d*. With the employees as a whole? If so, why?
    - *e*. With the employees, including their local union?
        1. If not, why not?
    - *f*. With the employees, including their national unions?
        1. If not, why not?
22. Would an agreement with the employees establishing a basic or minimum wage rate be compatible with scientific management, efficiency and economy? If not, why not?
23. Would a form of agreement covering terms of employment entered into with employees covering wages for labor performed, and providing for a reduction or an advance in the wages paid for specific work, accord-

ing to the condition of the labor market, the market price of the finished product, or the cost of living, be incompatible with scientific management, efficiency and economy? If so, why? If not, why not?

24. Would there be anything incompatible with scientific management, efficiency or economy, where an agreement exists with employees covering payment for labor, to have such agreement, when renewed, provide for a lower or a higher scale of compensation, bonus or premium? If so, why? If not, why not?

25. Would there be anything incompatible with scientific management, efficiency or economy in having a collective agreement with employees,

    a. Which would determine and regulate the basic wage, or hourly rate, the method of payment, the extent or amount of the task or 100 per cent. of accomplishment, the piece rates, differential piece rates, bonus rates or premium rates? If so, why?

    b. Which would determine and regulate the method of making time studies and setting tasks or units of work thereon, e. g., the conditions under which time studies are made, the mode of selecting workers to be timed, the mode of determining which particular readings shall be considered the correct time, the allowance for the human element and machine factors, etc.? If so, why?

    c. Which would determine and regulate the hours of labor? If so, why?

    d. Which would determine the number of apprentices to be employed to the number of journeymen at work? If so, why?

    e. Which would regulate the system of craft or trade education to be given apprentices during their period of apprenticeship? If so, why?

    f. Which would provide for payment to workers when idle during working hours through causes for which the management was responsible? If so, why?

    g. Which would provide for payment above regular rates for work performed outside of the regular and customary hours of labor? If so, why?

h. Which would enable a discharged workman to have his case referred to a committee of employees for investigation, and then for conference with the management? If so, why?

i. Which would establish seniority rights for the employees in each department under which promotion or advancement by seniority would prevail? If so, why?

j. Which would provide for the employment of union workers? If so, why?

k. Which would provide for what is termed the *preferential shop?* If so, why?

l. Which would provide for the employment of members of trade unions only? If so, why?

m. Which would provide for the acceptance and recognition by the management of a shop steward or business agent of a trade union, as a representative of the organized employees, the duty of such representative being:

1. To advise with employees in all matters affecting their terms of employment.
2. To carry out such instructions as might be given to him by the employees.
3. To investigate all complaints made by employees to him relative to any conditions or terms of employment.
4. To interview the management or the agents of the management in connection with such complaints in an effort to effect an adjustment of the dispute, or the removal of the cause for complaint.
5. To act as the agent of the employees to the same degree and extent as the management does for the stockholders, employing company or corporation.

If so, why, in each case?

26. In so far as trade unionism has existed among the men in this establishment, what effects has it had

Upon the attitude of the workers toward scientific management?

b. Upon the willingness of the workers to coöperate with the management in spirit and in practice in general?
c. Upon the discipline of the shop and respect for authority?
d. Upon the efficiency of the workers?
e. Upon further relations with unions?
f. Upon the willingness of the workers to coöperate with the management in meeting emergencies?
g. Upon the eagerness and ambition of the workers for training and advancement?

27. What does the management of this establishment consider to be the legitimate and helpful functions of labor organizations and of unionism? How would it have the workers organize? What would it have the union do and how would it have it carry on its legitimate work? In what matters and just how do you welcome the coöperation of workers?

28. What does this management consider to be specifically the defects and evils of unionism as it, at present, exists, and why?

29. To what policies and demands of unionism has the management of this establishment definite objections, and why?

SCHEDULE IX

Coöperative Possibilities

1. Would the management of this establishment consider it practicable to enter into collective agreements with the wage-workers of this establishment, or groups of such workers, for definite periods, governing:
a. Wages and their determination?
b. The method or methods of payment?
c. Time and motion study?
d. General shop conditions and conditions of employment?
1. If not, in each case, why not?

Would the management of this establishment consider it practicable to enter into collective agreements with the wage-workers of this establishment through the local, district or national unions to which the workers may belong, for definite periods, governing:

- *a.* Wages and their determination?
- *b.* The method or methods of payment?
- *c.* Time and motion study?
- *d.* General shop conditions and conditions of employment?
    1. If not, in each case, why not?
    2. If so, in each case, on what general terms?

3. If the management of this establishment considers it practicable to enter into collective agreements either directly with its own employees, or with them through the local, district, or national unions to which the workers belong, which of the following matters does it consider practicable to have determined by collective agreements:

- *a.* What shall be the hours of labor?
- *b.* What shall be the basic or minimum wage rate?
- *c.* What shall be the number of apprentices employed?
- *d.* What shall be the form of shop education to be given apprentices?
- *e.* What payment in addition to the regular rates shall be paid for all labor performed outside of the regular working hours?
    1. Week days?
    2. Sundays and legal holidays?
- *f.* What payment shall be made for all idle time during working hours for which the management is responsible? For spoiled work, bad materials and any other causes of loss of time or imperfect products for which the worker is not responsible?
- *g.* What rules shall exist regulating promotion or advancement according to the workmen's seniority?
- *h.* The extent to which workmen shall have a voice in determining the accuracy of time and motion studies
    1. As individuals?
    2. As a committee representing the employees in the department?
    3. As a committee representing the employees as a whole?
    4. Through the local officers of their trade union?

        5. Through the national officers of their trade union?

- *i.* The determination of the basic wages?
- *j.* The determination of the piece rates, the bonus rates, differential piece rates or premium rates to be paid?
- *k.* The determination of the amount of the task which shall entitle a worker to a bonus or a higher differential piece rate?
- *l.* The determination of the efficiency scale and the percentage of efficiency at which the payment of a premium shall begin?
- *m.* The form and severity of discipline including fines and suspensions?
- *n.* The privilege of discharged workmen to submit their cases to a committee of the employees, appointed by them for this purpose?
- *o.* The privilege of an employee to present any complaint which he may have against any agent of the management to a committee of the employees, appointed by them for this purpose?
- *p.* The provisions under which such committee of the employees shall present such matters to the management?
- *q.* The amount of remuneration which shall be paid a discharged employee should it be found that his discharge was unwarranted?
- *r.* The method to be adopted, should a dispute arise relative to the interpretation of any clause or clauses of the agreement?
- *s.* The alternative employment of workmen during times of business depression instead of the discharge of a number of employees?

        1. In each case, if not, why not?

4. Are there any other matters in this connection which the management of this plant considers practicable to be determined by collective agreement?
5. In the opinion of the management of this establishment, how far should such an agreement go in fixing the details of the terms and conditions of employment?

a. As covered by an agreement with a national union?

b. As covering special local conditions?

6. If the management of this establishment considers it practicable to enter into collective agreement, either directly with its employees, or with them through the local, district or national unions to which the workers may belong, which of the following methods of interpretation of the specific terms of the agreement, and determination as to whether they are being obeyed, does it consider practicable to accept as a part of such an agreement:

a. The decisions of professional experts appointed and paid by the employers, employees, or both?

b. Arbitration under which a third disinterested party has the deciding voice?

c. Reference to the officers of an employers' association and the national officers of the trade unions affected?

d. Reference to a joint committee of equal numbers representing the management and the employees?

e. Reference to a joint committee on which are equal numbers representing the management and the employees together with a professional and compensated individual having a deciding voice?

7. What possible methods for the interpretation of the specific terms of the agreement and determination as to whether they are being obeyed has the management itself to suggest?

8. If the management of this establishment considers it practicable to enter into collective agreement either directly with its employees, or with them through the local, district, or national unions to which the workers may belong, which of the following methods for the settlement of disputes between the management and the workers or their representatives, and for the enforcement of the agreement, does it consider practicable to accept as a part of such an agreement?

a. Arbitration, under which a third disinterested party has the deciding voice?

b. Reference to the officers of an employers' association and the national officers of the trade unions affected?

c. Reference to a joint committee of equal numbers representing the management and the employees?

d. Reference to a joint committee on which are equal numbers representing the management and the employees together with a professional and compensated individual having a deciding voice?

9. What possible methods for the settlement of disputes between the management and the workers, and for the enforcement of the terms of the agreement, has the management itself to suggest?

10. Is the management of this establishment familiar with the terms and workings of the protocols of the New York clothing trades? If so, does it see a possible solution of the problem of coöperation between scientific management and organized labor in the characteristic provisions and methods of operation of these protocols?

a. If so, why?

b. If not, why not?

11. What general and specific features of scientific management do the members of organized labor consider feasible or practicable of acceptance, supposing the principle of collective bargaining to be granted?

12. Do the members of organized labor see a possible solution of the problem of coöperation between scientific management and organized labor in the characteristic provisions and methods of operation of the New York protocols? If not, why not?

13. Would the management of this establishment be willing to have differences between itself and its employees settled by arbitration?

a. Through an arbitrator or a board of arbitration jointly appointed?

b. Through a board of arbitration, the odd member of which should be a government appointee?

THE END